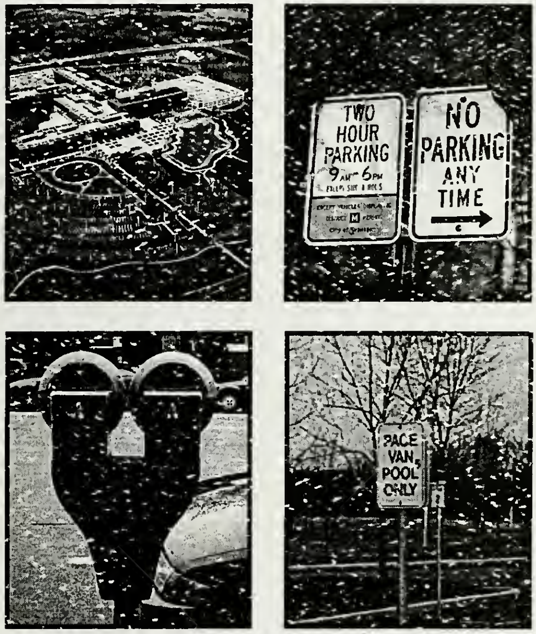
PARKING MANAGEMENT STRATEGIES:
A HANDBOOK FOR IMPLEMENTATION



REGIONAL
TRANSPORTATION
AUTHORITY

TRANSPORTATION LIBRARY
JUL 27 1995
NORTHWESTERN UNIVERSITY

RAN
L
77.C4
247s
.2

3 5556 023 534 464

PARKING MANAGEMENT STRATEGIES:

A HANDBOOK FOR IMPLEMENTATION

Prepared by:
K.T. Analytics, Inc.
Oakland, California

In Association with
Barton-Aschman Associates, Inc.
Evanston, Illinois
and
Eric Schreffler, Transportation Consultant
San Diego, California

May 1995

TRAN
TL
177.C4
P247a
C.2

TABLE OF CONTENTS

I

Page #

INTRODUCTION/OVERVIEW 1

II

PARKING SUPPLY STRATEGIES

PREFERENTIAL PARKING FOR CAR AND VANPOOLS 3
PERIPHERAL PARKING WITH SHUTTLES 9
ON-STREET CONTROLS 16
REDUCED MINIMUM PARKING REQUIREMENTS 21
PARKING MAXIMUMS 27
AREAWIDE PARKING CAPS 32

III

PARKING PRICING STRATEGIES

VEHICLE OCCUPANCY PRICING 37
TIME-BASED PRICING 43
REVISE/INITIATE PARKING TAXES 50
MODIFY/CASH OUT EMPLOYEE PARKING SUBSIDIES 57
ON-STREET PRICING 65

I

INTRODUCTION/OVERVIEW

PARKING MANAGEMENT MANUAL

Parking is costly to build, maintain and manage. Accordingly, parking managers whether in the public or private sector can benefit from latest information about effective strategies to provide and price parking. What strategies are available? What is the experience to date? How effective are the strategies? How can strategies be monitored and evaluated over time? What strategies might be best for serving employee needs while discouraging excess auto use in congested times and places?

The Regional Transportation Authority (RTA) has developed this Parking Management Manual to address these questions. It will help local jurisdictions considering new or revised parking codes for office and other developments attracting commuters. It will help localities evaluate the pros and cons of park and ride systems, on-street controls, "cash-out" ordinances, parking taxes, changes in rates at public garages, and other innovative public policy options in parking. The manual will help developers and employers understand options available for getting the best use of their parking resources through pricing, cashing out employee parking subsidies and providing preferential parking for rideshare patrons.

The RTA has a vital interest in parking because of its relationship to congestion and the use of autos and transit. Almost all parking in the United States is provided free to the user. The 1990 National Personal Transportation Survey found motorists reported receiving free parking for 99 percent of all automobile trips. A survey conducted by the RTA found that 97% of Cook County employers of 100 or more employees and 94% of employers of 100 or more employees in the collar counties provide free parking for all of their employees. Even in major urban areas with high priced parking, commuters often pay little or nothing for parking because employers provide it for free or at a discount.

One estimate places the parking subsidy as the equivalent of paying commuters 11 cents per mile of travel. The subsidy means developers, employers and localities must provide and manage a great deal of parking. The subsidy also makes auto uses more attractive and transit use less attractive. This subsidy is one that is available only to those who drive alone. People who rideshare, use transit, walk, or bike cannot use the benefit of a free parking space. In short, the subsidy increases the burden of supplying and managing parking, and spurs traffic congestion and air pollution as well.

The strategies featured in the Manual can address all these problems at once. Developers and localities may be able to provide less parking. Employers may be able to lease or manage less parking or get better use of their supplies. Commuters may find transit and ridesharing more attractive. And if the overall result is even a small reduction in the congestion problem, everyone will benefit.

Of course all the strategies need to be considered for their suitability to local situations. Some may not be feasible or acceptable in certain settings. Others may be judged too new to put into place just yet. Others may require more intensive management or new physical facilities not available to a particular business or institution or locality. The Manual is prepared to allow parking managers and transportation coordinators to understand all the important ramifications of the strategies and where and when strategies might fit with local situations. Managers and planners then can decide which strategies are worth considering.

None of the strategies in the manual should be implemented without step by step implementation and vigilant monitoring and evaluation. Many of the strategies are proven ways to reduce auto use and improve the efficiency of parking utilization. For example, a recent national study of forty-nine employer travel demand management and parking management programs found the most effective programs incorporated a tight supply of parking or parking pricing. However, it is not possible to predict precisely how any strategy will play out in each and every setting. Consequently, for each strategy, the manual suggests what to monitor and how. Some of the key variables to track include parking utilization, costs and revenues, abuse of privileges, and side effects on surrounding parking changes, transit use and ridesharing.

The Manual is organized into two main sections each containing chapters devoted to strategies. The first section summarizes strategies for providing and managing the supply of parking. The second section focuses on strategies related to parking pricing. Each chapter is prepared to "stand alone." Thus, the busy parking manager or planner can go to a chapter and get information about a particular strategy without having to read previous or subsequent chapters. However, since some of the strategies are mutually supportive or logically connected to others, each chapter indicates what coordination to consider with other strategies. Finally, a full set of references are provided to enable the reader to go to original source documents for further information.

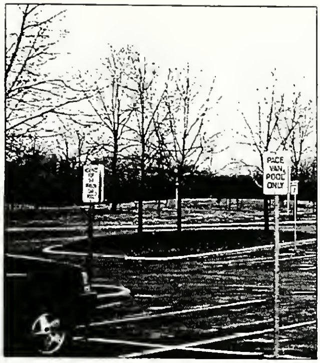
To help the reader focus in on strategies of the most interest to them, the following table indicates which entities (employers/developers or local government) can implement the strategies. In some cases, both the private and public sector can implement strategies. For example, employers, developers, and local government may initiate preferential parking for car and vanpools. In other cases, such as on-street regulations and pricing or parking code changes, only local government may implement the strategy.

WHO MAY IMPLEMENT PARKING STRATEGIES

Strategy	Employer/Developer	Local Government
SUPPLY STRATEGIES		
1. Preferential Parking	X	X
2. Peripheral Parking/Shuttle	X	X
3. On-Street Controls		X
4. Reduced Minimums		X
5. Parking Maximums		X
6. Parking Caps		X
PRICING STRATEGIES		
1. Occupancy Pricing	X	X
2. Time-Based Pricing	X	X
3. Parking Taxes		X
4. Modify/Cash Out Subsidies	X	X

II

PARKING SUPPLY STRATEGIES



PREFERENTIAL PARKING FOR CAR AND VANPOOLS

Definition: Desirable parking spaces are set aside for car and van pools or possibly clean fuel vehicles.

A. PLANNING

How It Works: Provides incentive for desirable mode by allowing access to close in, covered, secure or otherwise attractive parking spaces.

Most Applicable Contexts: Can be applied both on- and off-street, but most commonly applied off-street. Can be applied in public or private parking facilities. Especially appropriate in lower density areas where transit options are minimal. More applicable where parking demand meets or exceeds supply, to provide an incentive for use.

Examples: Designated spaces for rideshare patrons are quite common; designated spaces for clean fuel vehicles are very rare.

Some examples of long standing employer programs include:

- Employers including Hallmark Cards, Government Employees Insurance Company (GEICO), U.S. Pentagon, Aetna Life Insurance Company, General Dynamics, Electric Boat Division, Perkin-Elmer, and Gulf Oil have offered preferential parking by location[1].
- Santa Cruz County designates carpool parking for employees, as do several other city and state governments[2].
- Employers in downtown Seattle have offered close in parking for carpoolers as a result of City requirements[3].
- Programs of preferential parking by location are in place in Philadelphia, Minneapolis, Baltimore, Prince Georges County (MD), Greensboro (NC) and San Antonio[4].
- In the Chicago area, companies, localities and institutions which have implemented preferential parking include: Precision Twist Drill Company, Northeastern Illinois University, Marianjoy Hospital, Illinois Department of Transportation, Village of Arlington Heights, CTA (Cumberland Station), Metropolitan Water Reclamation District and Benefit Trust Life Insurance. Dupage County has encouraged “close-in, priority parking” for

rideshare patrons through its model trip reduction ordinance. (Most programs were implemented as part of The Employee Commute Option Demonstration Program beginning in 1992).

- The City of Sacramento plans to test preferential parking for low emission vehicles in the Midtown section of the City, but no other such programs are apparent in the literature[5].

Keys to Effectiveness: All depends on the relative attractiveness of preferential parking. For example, in large well utilized parking lots, stalls close to entrances will provide a shorter walk and possibly a sense of enhanced security. Other attractive parking options also may be effective. For example, covered, well lit parking might be designated as preferred, compared with surface and outlying parking areas. Effectiveness may be blunted in areas where transit use is substantial, as preferential parking may encourage some switching from transit to carpooling.

Effectiveness Experience: Experience shows mixed effectiveness. Early case studies of preferential parking by location indicated the tactic may well boost carpooling: Programs at Arkansas State Government in Little Rock, Hallmark Cards in Kansas City, Missouri, and the U.S. Pentagon showed increases averaging about 100 percent in carpool rates[6]. Reports of two more recent programs also suggest some success, one at Nike, Beverton, OR[7] and another at Geico, Washington, D.C.[8] But other evaluations show some ineffective programs:

- Seattle: The city has encouraged carpool preferential parking at numerous employment sites in the downtown by requiring developers to reserve a minimum of 20 percent of parking spaces for carpools. Early results from the set aside policy showed very little use of preferential spaces by employees. More recent evaluations by City staff continue to show mixed results.[9]

- Sunnyvale: This California city also required certain developers to designate close in parking. Again, few if any carpoolers used the stalls.[10]

Compliance with Ordinances, Codes: Public parking authorities sometimes encourage this strategy through administrative action. Developers sometimes are required to implement the strategy through travel demand management and/or developer agreements. Employers can work with building managers to designate preferential stalls, either informally or formally as part of space lease.

B. HUMAN RESOURCES

Human resources are needed for several functions. In terms of administration, personnel time is needed to determine eligibility and certify legitimate pools. For operations, human resources are required to monitor use of preferential space and dissuade abuse. Spot check monitoring determines if ineligibles are poaching stalls and whether eligible rideshare patrons are continuing to pool. If parking collection or attendant personnel already are present, the added effort of monitoring carpoolers will be small. However, where there are no such personnel, a transportation or parking coordinator must be designated. Lastly, personnel time is needed to make program modifications and evaluate the program.

It is not unusual for Transportation Coordinators to carry out most if not all these functions where the number of preferential stalls is small. In such cases, Coordinators can spot check stall use or work with parking enforcement personnel for this purpose. They also can track use of the stalls and by windshield surveys or regular employee transportation surveys can determine the prior mode of stall users. An effective program will not only show good use of stalls but also capture a high proportion of previous solo drivers.

C. ADMINISTRATION

Policy: Written preferential parking policies should be developed and provided to employees. Such policies might be incorporated into company employee benefit or personnel policies, or kept as separate policies depending on the degree to which a company and labor negotiate preferential parking as a specific benefit. In any case, adopted policy is important because it provides corporate commitment to the program and specific guidelines on eligibility, privileges and sanctions against abuse. Important specific guideline policies address whether rideshare patrons must arrive together to be eligible for stalls or if drop off is allowed; whether vehicles must be registered and display permits; and whether carpool stalls not occupied by some time (e.g. 10 a.m.) can be used by any and all parkers. Another policy issue relates to building lease policies. For employers leasing space at commercial lots and garages, leases may have to be modified or renegotiated to insure implementation of preferential parking.

Fee Collection: Usually, for preferred parking by location, no special fees are required. Nor are one time registration fees common.

Eligibility: Eligibility criteria are important to establish and enforce. Will a carpool be set at two or more or three or more persons? Will carpoolers be required to arrive in the parking facility with members or are drop offs allowed? Will eligibility hinge on a minimum number of days per week of carpooling?

It is advisable to set criteria on the lenient side at the start of a program, then tighten up depending on demand and abuse patterns. For example, two person carpools might be allowed at first, as well as a three day per week minimum with drop off privileges. However, if demand exceeds allocated space or abuse appears a problem, one or more of these criteria can be tightened.

Reporting: Another important administrative function is reporting to local or regional jurisdictions on carpool programs, whether alone or in combination with other travel demand strategies. If the jurisdiction has a travel demand ordinance, an employer may be bound to report regularly on the number of carpoolers. If not, it still is advisable to keep careful records of employee commute mode to facilitate evaluation and support voluntary reporting to the jurisdiction, other employers or local Transportation Management Associations.

Localities requiring or agreeing to preferential parking at new developments should require reports to insure the parking is provided and spot check such reports. In one study of compliance, Sacramento County found "very few" had implemented the required facilities[11].

Policy Coordination: Employers should attend to carpool policies adopted by local jurisdictions. For example, some jurisdictions may encourage carpooling at public lots or employment sites through preferential close in parking. It may be wise to be consistent with public policy on eligibility and other matters especially where an employer's parking facilities are close to such public lots. An employer preferential parking program which is less attractive than the preferential program at nearby city or county parking open to the public will detract from use of the employer's program.

Cost/Revenues: Costs will depend mainly on the degree of monitoring and whether there already are parking attendants managing garage or lot parking. Cost for designating parking stalls for carpoolers are minimal. Depending on how implemented, capital costs could include permits, signage, costs for striping/marking preferential spaces, and possibly additional security measures such as lighting. Enforcement costs probably will exceed capital costs. The employer or building management must either check for carpool permits or monitor vehicles as they arrive in lots and garages for carpoolers. If parking collection or attendant personnel already are present, the added cost of monitoring carpoolers will be small. However, where there are no such personnel, a transportation or parking coordinator must be designated to spot check carpool parking.

Where preferential parking policies reduce employee parking demand, they may reduce the amount of parking an employer needs to lease from building owners. Lease parking per stall may range from $30 to over $100 per month in U.S. cities. Some employers may be motivated to implement parking management programs in part to reduce employee parking demand or live within a tight parking supply.

In the long term, to the extent employee parking demand is reduced through preferential parking, developers will save by reducing the amount of garage and parking lot space necessary to service commuters. As an illustration, suppose the developer is allowed to build 1,000 fewer surface spaces around an office building because of reduced commuter parking demand. A conservative estimate of amortized savings might be about $900 per stall per year. Amortized over 30 years at 10 percent, the annual savings are about $95,500 per year. Operations and maintenance savings might be $100 per space per year, or $100,000.

D. PHYSICAL FACILITIES

Entrance/exit systems: The strategy requires no modifications to entrance and exit control systems.

Permits/stickers: Employers may wish to issue permits to carpoolers which are displayed on a dashboard or hung on the rear view mirror. Such permits are an added visual assurance that vehicles parked in preferential stalls were driven by a certified carpooler.

Signs/Information: Preferential stalls must be marked to indicate for carpoolers only and applicable times. For example, signs might read "Carpools Only Before 10 a.m." Signs also should indicate what office to contact for information about preferential parking permits or to report suspected abuse.

Stall layouts: Preferential parking stalls should be located as close to building entrances as possible and/or in covered areas. No special dimensions are required. However, if the company or parking operator has some proportion of stalls designated for "compacts," then it is important to work out whether all the preferential parking stalls will be full size or not.

Security: No special security systems are needed to complement preferential parking. By its nature, close in parking should give users a sense of greater security. However, if covered parking is the only incentive, then adequate lighting is a consideration.

E. MONITORING AND EVALUATION

Monitoring: Spot check monitoring determines if ineligibles are poaching stalls and whether eligible rideshare patrons are continuing to pool. Abuse of preferential parking is not uncommon, especially for long running programs. The best preventive measure is simply to require carpoolers to arrive together in the preferential stall. In this way, spot checks can determine compliance immediately. If drop off is allowed, enforcement is much more difficult. In this case, it is necessary to call poolers periodically in an effort to determine if residence or work times have changed and whether they are still carpooling. Such checks are not a full proof deterrent to determined abusers but can cut down the rate of abuse.

Evaluation: The impact of preferential parking entails a couple of steps. One, regular counts should be done to determine stall utilization. Two, stall users should be surveyed about prior mode of use. These surveys may be done through window postcard or regular employee surveys carried out as part of overall travel demand management programs. Prior mode surveys will indicate to what extent preferential parking is serving existing pools or forming new pools. The survey also should determine the degree to which the program is drawing users from transit, walking and cycling as opposed to solo driving. An effective program will not draw away transit users or simply reconstitute carpools existing prior to the preferential parking program. Instead, it will attract a high proportion of solo drivers.

1 "Traveler Response to Transportation System Changes: A Handbook for Transportation Planners," R.H. Pratt Associates, for the Federal Highway Administration, February 1977; and "Ridesharing Programs of Business and Industry," Dingle Associates, for FHWA, April 1982.

2 Innovations in Parking Management, for the Urban Mass Transportation Administration, Public Technology Inc., Washington, D.C., 1982.

3 "Parking Management and Traffic Mitigation in Six Cities: Implications for Local Policy," Thomas J. Higgins, K.T. Analytics, Inc., Paper presented before the Transportation Research Board, January 1989.

4 "Final Report on HOV Support Facilities and Programs," for MTC, by Cambridge Systematics, Inc., July 1990.

5 California Parking Professional, by the California Public Parking Association, Spring 1992.

6 Pratt, Op. Cit.

7 "Beverton, OR." Urban Transportation Monitor, Vol. 7, No. 6, April 1993: p. 5.

8 "Parking Management as a TDM Tool," TDM Series, CTS, Los Angeles, no date.

9 Higgins, Op. Cit.

10 "Flexible Parking Requirements," An Urban Consortium Information Bulletin, Public Technology, Inc., Washington, D.C., June 1982.

11 Trip Reduction Program Evaluation Study, Sacramento County Planning Department, September 1988.

II

PARKING SUPPLY STRATEGIES

PERIPHERAL PARKING WITH SHUTTLES

Definition: Parking on the periphery of downtown or activity centers served by shuttles or transit.

A. PLANNING

How It Works: Localities or employers or Transportation Management Associations establish or lease peripheral parking outside the main core area of an activity center. Shuttle service connects the parking to the activity center. The shuttle system may be developer or employer operated, or operated by a transit district. Parking may be open to all or designated for car and vanpools.

Most Applicable Contexts: Best prospects for realizing reductions in auto use through peripheral parking are where some or all of the following conditions apply:

- Commercial, lease and public parking is well utilized and expensive, whereas peripheral parking is readily available, secure and free or low cost.
- The costs of providing parking on site are high (e.g. in structures or underground) compared to securing outlying parking. In such settings, developers and lenders may be more willing to consider peripheral parking.
- Transit capacity or shuttle service to/from lots is frequent and not saturated.
- Alternative parking supplies (streets, vacant land, neighborhoods) are at a minimum or new controls and/or enforcement are planned.

More dense urban areas provide the best opportunity for peripheral parking. Here, the high cost of parking may encourage developers to seek reduced parking in return for traffic mitigation strategies. Or, if parking subsides are to be reduced or cashed out, commuters may feel an incentive to seek lower priced peripheral parking.

Examples: A dated survey of 173 cities spanning all city sizes found 29 percent of respondents had constructed peripheral lots where users either walk or ride transit to final destinations[1].

In the Chicago area, Benefit Trust Life Insurance has offered shuttle service to a rail station park and ride lot. Sears runs shuttles to train stations and buses to remote parking lots.

Keys to Effectiveness: The intended effect of peripheral parking is less traffic on activity center streets, along with reductions in emissions associated with stop and go driving. The effectiveness of the strategy in reducing congestion and emissions greatly depends on where the most congestion appears. If most of the congestion and travel delays occur on freeways leading into an activity center as opposed to on streets within the center, then peripheral parking may have little impact on congestion and associated pollution.

Another key to success relates to the target market. Peripheral lots may attract solo drivers, carpoolers or transit users depending on their location, price, security and frequency of shuttle service. Clearly, the more solo drivers attracted the better. One survey in Seattle found 35 percent of those using park and ride lots in the region (some peripheral) previously drove alone[2].

Effectiveness Experience: Localities have had difficulty encouraging implementation of peripheral parking systems:

- San Francisco, CA: The City has identified potential fringe parking lots (mostly now utilized by Caltrans, the State highway and transportation agency) for possible development of park and ride facilities. The City intends for private developers to develop the lots and implement shuttle systems as an alternative to providing parking on site. For now, no developers have come forth with proposals to implement peripheral parking as a way to beat the high price of providing parking on site, as planners believed might happen or yet happen[3].

- Hartford, CT: The city instituted a policy allowing parking requirements for new developments to be reduced by up to 30 percent for shuttle service from off-site parking. Additionally, through administrative review procedures rather than code, the City requires office developers to put new parking underground. The intent was to encourage parking off-site and shuttle service. City planners hoped developers would provide peripheral parking and shuttles as a result of requirements for underground parking and reductions in required on-site parking. Instead, developers lease nearby surface parking where available and provide it to tenants.

- Orlando, FL: Under the 1982 downtown "parking district overlay ordinance," a developer could avoid construction of up to 20 percent of required parking in exchange for contributions to a transportation management trust fund. Contributions were based on 80 percent of the construction cost of parking stalls not built. No contributions were made to the trust fund as of 1986. Developers and lenders claimed it was important to provide at least the minimum required parking to stay competitive in the office market place[4]. Since the time of this research, the City itself has constructed 8,000 spaces at the periphery of downtown, but the program has not been evaluated[5].

On the other hand, there are some success stories with peripheral parking facilities and shuttles pointing to the importance of the particular market user and, especially, the supply and price of parking in the area served by the shuttle:

- New Orleans: In the mid 1970s, the City operated a successful shuttle service from the Superdome to the CBD, where 85 percent of the 5,000 spaces were occupied on a typical day. The program shifted about 1,200 cars from parking in the central part of the city[6]. However, high cost of the operation and low parking and shuttle fees created a large deficit. Attempts to increase rates reduced ridership significantly[7].

- The University of Maryland has operated a successful shuttle program of 25 buses serving 750,000 annually. Routes serve parking areas, residential areas, campus and the regional public transit system[8]. Of course, because students generally own fewer cars and earn less than commuters, they probably are attracted more to transit than employees. Also, colleges exert more control over students than employers exert over commuters. For example, the Massachusetts Institute of Technology does not grant parking permits to students if they are within the service area of the regional public transit system[9]. UCLA also considers proximity to transit in allocating parking permits[10].

- San Francisco Hospital Examples: Some hospital shuttles have been successful, along with other demand management strategies, but parking management again appears a key to success. One recent evaluation of six hospital demand management programs in San Francisco, California found no significant difference in the proportion of solo drivers at institutions with and without shuttles. The key factor affecting use of all alternative modes, including the shuttles, was "Monthly on-site parking cost...followed by off-site factors of on-street parking limits."[11]

- Other Hospital Examples: Hospital shuttles seem to work by combining parking restraints with good shuttle service. Good Samaritan Hospital in Portland, Oregon, requires new employees and nursing school students to use satellite lots served by shuttle. The shuttle runs about every five minutes in the peak periods. Lots are guarded. The lots are always full and about 300 students and employees ride every day. A system of permits and regulations prevent much employee on street parking. The hospital garage is reserved for patients, doctors and employees with seniority[12]. The Crouse-Irving hospital in Syracuse, New York initiated a well utilized shuttle by raising employee parking fees at its garage and offering free park and ride service at outlying lots running every seven minutes in the commute periods. Security officers drive employees to the lot in off hours. About 350 vehicles use the lots, and increased parking revenues cover shuttle costs[13]. A free remote lot for employees of the San Jose Medical Center two blocks from the hospital attracts some use, but many employees continue to park on street in adjacent residential neighborhoods[14].

- Recreational Shuttles: Capitola, California has operated a successful beach shuttle for ten years. Parking meters and residential preferential parking along the beach contribute to its success, according to one review[15]. About 30,000 people ride the shuttle during summer months. The same parking restrictions have made the free Santa Cruz shuttle a success since 1976. Of the 23,000 riders in 1986, 89 percent said their main reason for riding was to avoid parking problems[16]. Other successful beach shuttles operate in Santa Barbara, Monterey and San Diego. Funding usually comes from a combination of hotel taxes, general funds, fares and parking revenues.

- A Downtown Example: A downtown Denver shuttle has been successful in part because it operates in a "transit mall" where auto use is restricted. Twenty-six shuttle buses carry passengers along the mall. About 48,000 passengers ride per weekday. Buses operate at 70 to 75 second intervals[17].

Compliance with Ordinances, Codes: Public parking authorities sometimes encourage this strategy through developer agreements and travel demand management ordinances. Developer agreements might be negotiated as part of the environmental review and permitting process.

B. HUMAN RESOURCES

Human resources are needed for planning, negotiations, operations, marketing and evaluation. Considerable planning is needed to determine best locations for intercepting trips. The location also should have minimal adverse impact on adjacent properties. Developer agreements need to be negotiated to specify the particulars of service and its duration. Other negotiations will be needed to secure parking lot and shuttle operation agreements. Once the system is operational, the developer, employer or TMA operating the park and ride system must market the system preferably in cooperation with activity center employers and merchant associations. Labor time also is needed to monitor the performance of the shuttle bus provider, lot use, lot security and program costs. A Transportation Coordinator may carry out these functions along with other travel demand management program duties. As with other strategies, the Coordinator also should survey use of the system and prior mode of users.

C. ADMINISTRATION

Policy: The need for written policies governing lot use will depend on particular applications. Generally, park and ride lots are open to any and all employees bound for the destination served by the shuttle service. However, in some cases the parking may be reserved for particular employees or users of the destination. A hospital, for example, may require interns or students to park in park and ride facilities in order to maximize availability of close in parking for patients and medical staff. In such cases, a written policy is important to inform relevant employees of the restrictions on lot use. The policies will specificy guidelines on eligibility, privileges and sanctions against abuse.

Fee Collection: Usually, for preferential parking with shuttle service, no special fees are required since the intent is to maximize use. Most of the example systems are either free or very low cost.

Eligibility: If the peripheral park and ride system is open only to certain categories of commuters, eligibility criteria are important to establish and enforce.

Reporting: If a jurisdiction has negotiated an agreement with a developer to establish the parking and shuttle system, the developer and/or employers in the activity center served by the shuttle should be required to report on use of the system. Even if there is no regulatory impetus for reporting, it still is advisable to keep careful records of use and customer satisfaction to facilitate evaluation and support voluntary reporting to the jurisdiction, other employers or local Transportation Management Associations.

Policy Coordination: Sponsors of peripheral parking and shuttle programs should check with public transit agencies about plans for similar services. It may be that new services will compete with the sponsor's service. A coordinated effort may save on cost and maximize utilization of park and ride systems.

Lot/Bus Leases: Lease arrangements are needed to secure park and ride lot facilities and shuttle operations, unless the project sponsor already owns appropriate land and vehicles.

Cost/Revenues: Costs will depend on lease costs for parking and shuttle operations, presuming the program sponsor does not already own appropriate parking and shuttle facilities. For developers, employer associations or transit districts taking on direct operation of a peripheral parking and shuttle system, the costs can be considerable. Specifically, capital costs for surface parking range from $1,200 to $2,000 per space depending on the type of control system, lighting and landscape. Operating and maintenance costs are between $70 and $100 per space per year (presuming no cashiers). Bus shelters range from $4,500 to $6,000 per unit depending on bus size.

Some typical costs for purchasing and operating two 25 passenger vehicles for A.M. and P.M. peak service and operating the service 252 days per year are as follows:

Capital Costs: $90,000

Annual Operating Cost:

Labor:	$52,416 (16 hours per day at $13 per hour)
Administration:	$10,483 (20 percent of labor)
Fuel:	$ 6,048 (120 miles/day at $0.20/mile)
Maintenance:	$ 3,024 (120 miles/day at $0.10/mile)
Insurance:	$ 5,000 ($2,500 per vehicle, unless self insured)

Total Operating Costs: $76,971

It is important to evaluate costs for direct operations and contracting. Compared to owning and operating shuttles, contracting may be less costly. Contacting also allows for easier expansion, contraction or termination of service. Nor is any up front capital investment required. The Bellevue, WA TMA, for example, contracted with a private bus company for its holiday shuttle. Some feeder bus services to the rapid rail system in the San Francisco Bay Area, BART, are contracted.

Three important cost items sometimes overlooked are promotion, administration and insurance. Liability insurance may be expensive or difficult to obtain for TMAs or developers or business associations operating shuttles and park and ride lots. Administration involves overseeing drivers, maintenance, contractors, security and monitoring performance. A monitoring system should track daily or annual operating costs, ridership and revenues. Spot checks are important to assess average wait times, average travel time and user satisfaction. Promotion entails maps, schedules, signs, mailers and regular promotional events.

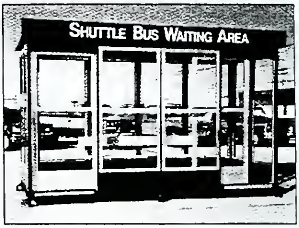
Where peripheral parking and shuttle systems reduce employee parking demand, they may reduce the amount of parking an employer needs to lease from building owners. As previously noted, lease parking per stall may range from $30 to over $100 per month in U.S. cities. Lease parking in peripheral locations may be half these rates.

D. PHYSICAL FACILITIES

Entrance/Exit Systems: The need for modification to entrance or exit controls will depend on the user group. If shuttle ridership is limited only to a specific group, a card access system would be one means of preventing unauthorized users from entering the parking facility. If parking is controlled with permits or is open to all, no entrance or exit controls would be needed.

Permits/Sticker: If shuttle ridership is limited only to a specific group, vehicle permits or stickers might be used to enforce regulations and assure that parkers are valid users of the facility. Another option is for gate controls and access cards. See above.

Signs/Information: Lot signage is needed to direct parkers to the lot and assign car or vanpool parkers to designated areas in the lot or garage, if any.



Stall Layouts: Bus shelters and bus pick-up/drop-off areas need to be created in existing and new lots. Some parking stalls in an existing lot might be lost due to the construction of shelter areas.

Security: Periodic security patrol is needed to ensure safety for users and to protect vehicles while they are parked. Adequate light levels are needed for early morning and late evening, especially in winter months.

E. MONITORING AND EVALUATION

As mentioned, a monitoring system should track daily or annual operating costs, ridership and revenues. Spot checks are important to assess average wait times, average travel time and user satisfaction. If shuttle service is contracted, the agreement for service should insure managers of the system will ride each shuttle at least once per week and follow shuttle buses regularly to assess driver safety. Buses also should carry plaques indicating where passengers may call for suggestions and comments. Finally, on-board surveys should be conducted regularly to assess rider satisfaction, background of user, reasons for use and mode of use prior to taking the shuttle.

1 "Evaluation of Parking Management Strategies for Urban Areas," Martin Parker and Michael Demetsky, Virginia Highway and Transportation Research Council, Charlottesville, VA, 1980.

2 "Final Report on HOV Support Facilities and Programs," for MTC, by Cambridge Systematics, Inc., July 1990.

3 "Parking Management and Traffic Mitigation in Six Cities: Implications for Local Policy," Thomas J. Higgins, K.T. Analytics, Inc., Paper presented before the Transportation Research Board, January 1989.

4 "Ten Cities' Strategies for Transportation Demand Management," Carolyn Flynn and Lawrence Glazer, Transportation Research Record No. 1212, 1989.

5 Parking Management Case Studies, TMS Inc., for the City of Boulder, Central Area.

6 "Innovations in Parking Management," for the Urban Mass Transportation Administration, Public Technology Inc., Washington, D.C., 1982.

7 Telephone interviews with City Planning and Public Relations staff, 1988.

8 "Ridesharing Programs of Educational Facilities," Dingle Associates, for the Federal Highway Administration, September 1982.

9 Dingle Associates, Op. Cit.

10 "Evaluation of Travel Demand Management Measures to Relieve Congestion," Comsis Corporation, for the Federal Highway Administration, February 1990.

11 "Factors Affecting TDM Program Effectiveness At Six San Francisco Medical Institutions," Richard Dowling, Dave Feltham and William Wycko, Paper before the Transportation Research Board, January 1991.

12 Transport Briefs, K.T. Analytics, Inc., Briefs Nos. 1 and 5, Oakland, California, 1986.

13 "Case Studies of UMTA Private Sector Initiative Projects in Syracuse, Central New Jersey and Atlanta," Crain and Associates, for the U.S. Department of Transportation, 1986.

14 "Remote Parking," California Parking Professional, Publication of the California Public Parking Association, Spring 1992.

15 "Beach Shuttles," Gail Rosen, Waterfront Age, California State Coastal Conservancy, Summer 1988.

16 Gail Rosen, Op. Cit.

17 Urban Transportation Monitor, Vol. 4, No. 7, April 13, 1990.

II

PARKING SUPPLY STRATEGIES

ON-STREET CONTROLS

Definition: Regulates parking time on-street.

A. PLANNING

How It Works: In most U.S. localities, limits are posted by on-street signs to indicate how long parking is permitted. Outside the U.S., some jurisdictions use disks or permits to regulate timed parking, whereby a dial indicator or punch out shows time of arrival. Enforcers chalk tires and/or note license plate numbers to enforce time limits, or note expiration time for disks and permits. New hand held electronic devices allow enforcers to spot vehicles with large numbers of unpaid violations. Some jurisdictions "boot" and tow such vehicles so they can not be driven until fines are paid.

Most Applicable Contexts: Used in commercial zones to encourage turnover of shoppers and discourage long term commuter parking. Also used in neighborhoods to discourage commuter parking, with exemptions given to residents ("preferential parking") and wherever illegally parked vehicles contribute to intersection congestion, lost access to loading zones and reduced pedestrian visibility.

Examples: Timed zones are used alone or in combination with parking meters in most medium to large cities in the U.S. While timed zones are common in many cities, aggressive and strict enforcement programs combining plentiful enforcement, towing and booting are documented in fewer cities, including Boston, Washington D.C., San Francisco, Colorado Springs and Billings, Montana[1].

Keys to Effectiveness: Curb parking management serves as a support strategy for demand management measures aimed at reducing auto use. For example, it supports both restraints on the supply of off-street parking (e.g. reduced minimum requirements, maximum requirements and caps on areawide supplies) as well as parking pricing measures (e.g. increased parking pricing for commuters, removal or cash out of employer parking subsidies, parking taxes). In short, it supports any program attempting to shift commuters away from solo driving by minimizing commuter "spillover" onto streets intended for shoppers or residents.

Effectiveness Experience: There have been no evaluations of the effectiveness of timed curb zones in boosting use of transit, carpooling and other alternatives to solo driving. However, dated evaluations have been done of how increased enforcement stems violations of on-street regulations, including timed zones. Presumably such enforcement encourages more commuters to use off-street parking and, where such parking is tight and expensive, to use transit and carpools. The most carefully evaluated cases are in Washington, D.C. and Boston, Massachusetts.

- In Washington, D.C., an enhanced enforcement program employing 50 enforcers, nine two person booting crews and 25 private contract towing cranes dramatically increased ticketing and reduced parking violations. Tickets increased 38 percent over the five year evaluation period, booting increased 275 percent and towing increased 187 percent. The result was a drop in parking violations per block from 5.85 to 1.90 in the central business district and from 2.6 to 1.5 in residential areas. Long term parking (presumably by at least some commuters) fell and short term parking (presumably mostly shoppers) grew, as evidenced by an increase in parking turnover from 1.7 to 2.1 vehicles per hour[2].

- Another assessment of increased enforcement and booting in Boston concluded, "parking lots also appear to be more heavily used since the introduction of booting..." underscoring the importance of on-street management in commuter travel and parking choices[3].

Compliance with Ordinances, Codes: On-street enforcement policies and procedures must be in compliance with certain adopted ordinances, fee schedules, personnel policies and adjudication procedures. See section on Administration.

B. HUMAN RESOURCES

Localities require human resources to administer, operate and enforce regulation of on-street parking. Increasingly, localities are turning to contracting of enforcement functions so that administration focuses more on contract management than direct provision of service[4]. Where localities administer their own programs, human resources must be allocated to several important operational and administrative systems. Some include constant staff training to minimize erroneous or inconsistent enforcement; towing and booting procedures; impound vehicle procedures; public information; and adjudication, whether carried out by locality criminal courts or traffic departments. Such a system must quickly hear and decide cases, minimize wait time and not overburden the judicial system[5]. Many jurisdictions have decriminalized parking violations, thereby removing them from the criminal court to an administrative adjudication[6].

C. ADMINISTRATION

Policy: Parking ordinances establish timed zones, regulations and penalties against violation. Ordinances or charters also establish department responsibility as to police versus civilian duties and legal authority for administrative adjudication, if needed.

Enforcement policy must be balanced. Lax enforcement will encourage parking beyond time limits. Strict enforcement will encourage more compliance, though some commuters can be expected to "shuffle" cars within the zone[7]. Strict enforcement also risks merchant displeasure and public protest. As a general rule of thumb, an enforcement program should insure areas with on-street parking restrictions are enforced at least three times per day.

Fee Collection: Parking fines comprise fees in the regulation and enforcement of timed street parking. Fee collection is not easily accomplished. Collection rates for on-street enforcement may be as low as 35 percent or less[8]. Accordingly, some states now put holds on renewal of vehicle registration until delinquent violations are paid.

Reporting: Departments responsible for regulation and enforcement of on-street controls must report to decision makers on a number of procedural and performance measures. Some measures typically include gross and net revenues, citations issued per zone per year, fine collection rates, public complaint volumes and service level measures such as enforcer passes per hour or day in regulated zones.

Policy Coordination: On-street controls should be coordinated with local travel demand and parking code policies. Strong enforcement of street regulations can encourage commuters to consider travel alternatives promoted by travel demand programs. Also, on-street controls support parking supply restrictions such as maximums and caps, again insuring commuters do not poach retail or neighborhood parking and instead give strong consideration to transit and rideshare alternatives.

Cost/Revenues: For most on-street enforcement programs, revenues usually exceed enforcement costs, and may be used to support a variety of locality services. For example, parking enforcers wrote 2.6 million tickets in San Francisco in 1992, with fines grossing $20 million after ticket writing costs. Revenues go into the City general fund[9].

D. PHYSICAL FACILITIES

Entrance/Exit Systems: With on-street controls there would be no entry/exit system.

Permits/Stickers: A few cities, mostly overseas, use "on-board" or in-vehicle cards or disc to regulate timed parking. The user punches out the day and time on a card and hangs it in a window or sets a dial for time of arrival. Enforcers then check the permit for overtime parking.

Signs/Information: Signs identify parking areas and the regulations, including time that regulations are in effect.

Stall Layouts: Timed parking zones may or may not have markings designating stalls.

Security/Enforcement: On-street timed zones require enforcement by chalking or hand held "ticketwriters." "Boots" also may be needed to enforce against repeat offenders.

E. MONITORING AND EVALUATION

Monitoring: It is very rare for on-street control programs to be monitored and evaluated in terms of travel demand or traffic management purposes. Usually, monitoring focuses on citation volumes and payment levels, enforcement personnel services and public complaints. Occasionally, programs are examined for their effects on parking duration and turnover levels. However, it should be possible to monitor and evaluate control programs where they are instituted in part to support travel demand management efforts. For example, where a travel demand program at an employment center threatens to spill commuters into retail or residential areas, timed parking regulations with appropriate enforcement is one way to protect such areas. Monitoring through periodic license plate surveys should focus on the volume of violations to short term parking limits as well as trends in car "shuffling" in such areas.

Evaluation: It may be very difficult to assess the degree to which on-street enforcement programs are supporting employer travel demand management programs. However, by evaluating trends in violation rates, citations, parking duration and shuffling in areas close to employment centers with travel demand management programs, it should be possible to gauge the overall effectiveness of parking enforcement in discouraging long term parking. Such discouragement can be very important to supporting the goals of employer travel demand management efforts.

1 "Innovations in Parking Management," for the Urban Mass Transportation Administration, Public Technology, Inc., Washington, D.C., 1982.

2 "On-Street Parking Management Programs," Raymond Ellis, Transportation Research News, No. 98, January-February 1982.

3 "Enforcement of Parking Management Strategies: A Critical Element in Program-Project Implementation," James Sheldon-Dean and Michael Meyer, Transportation Research Record 816, Transportation Research Board, Washington, D.C., 1981.

4 "Privatizing On-Street Parking Operations," Toby Fox, California Parking Professional, Fall 1994.

5 Study of Parking Management Tactics, Volume III: A Reference Guide, John DiRenzo, et. al., Peat, Marwick and Mitchell, December 1979.

6 "A Systems Approach to On-Street Parking Enforcement," Jim Kennedy, National Parking Association, February 1994.

7 Santa Barbara has documented this behavior and dubbed it "the 90 minute shuffle. See "Santa Barbara's Experience with Free Parking," Mike Lowe, Parking Professional, IMPC, May 1991.

8 Kennedy, Op. Cit.

9 Parking Professional, IMPC, August 1993.

II
PARKING SUPPLY STRATEGIES

REDUCED MINIMUM PARKING REQUIREMENTS

Definition: Reduces the amount of parking developers are required to provide as specified in zoning codes.

A. PLANNING

How It Works: Localities exert control over parking supplies through the zoning code. Usually, parking codes establishing the amount of parking developers must provide ("minimum" required). Localities can allow reductions in minimum requirements (sometimes called "flexible" requirements) in return for developer agreements to support transit, carpooling, cycling or for payment into a municipal parking or traffic mitigation fund.

Most Applicable Contexts: Best prospects for realizing reductions in auto use through parking supply restraints are where some or all of the following conditions apply:

- Developer and lender preferences or minimum parking codes result in more parking than is utilized. In such settings, minimums might be lowered if they are the cause of overly ample supplies.
- Mixed uses are available or planned where parking supplies can be shared. In this setting, localities can negotiate for parking supplies serving several compatible uses instead of separate and more extensive supplies serving each use.
- Commercial and public parking is well utilized, thereby limiting opportunities for parkers to simply shift parking locations as supplies are tightened.
- The costs of providing parking are high compared to traffic mitigation alternatives. In such settings, developers and lenders may be more willing to reduce supplies.
- Transit capacity is frequent and not saturated, offering a good alternative for drivers affected by tightened supplies.
- Uncontrolled supplies (streets, vacant land, neighborhoods) are at a minimum or new controls and or enforcement are planned.

One candidate for reduced minimums may be lower density, suburban areas. Supplies in these communities tend to exceed demand. Surveys of suburban office parks show supplies between 3.5

and 4.0 spaces per 1,000 square feet of floor space, and surveys of usage in California and Texas found office workers only required about 2.2 spaces per 1,000 square feet[1]. Recent surveys in King and Snohomish Counties, Washington also indicate excess supplies[2]. These same lower density, suburban communities may also be sites for new mixed use developments where parking can be shared across uses.

More dense urban areas also may provide opportunities. Here, the high cost of parking and land may encourage developers to seek reduced parking in return for traffic mitigation strategies. Or, if parking subsides are to be reduced or cashed out, parking requirements might be reduced to be more in line with new anticipated parking demand. Finally, parking requirements may be reduced in proximity to transit stations where employee transit use may well reduce parking demand.

Examples: Used in a several localities active in travel demand management programs.

Some examples include:

- The City of Hartford, Connecticut, reduces minimum required parking in return for developer carpool and transit encouragements.
- Similar reductions in minimums are found in Palo Alto and Sacramento, California; Chicago, Village of Hoffman Estates (by annexation agreement not parking code) and Schaumburg, Illinois; Seattle, Washington and Dallas, Texas.
- Montgomery County, Maryland reduces minimum requirements in proximity to rail stations.
- Phoenix, Arizona allows relaxations in proximity to bus transit.
- Calgary, Canada, and Orlando, Florida, have required or allowed payments "in-lieu" of on-site parking. In Calgary, fees support municipal parking, whether central or peripheral to downtown; in Orlando, they support a transportation management program[3].

Keys to Effectiveness: The intended effect of reduced parking minimums is less solo driving and increased use of transit, carpools, walking and cycling. Effectiveness depends on how the required supply relates to parking demand. In the best case, reduced parking supplies encourage less auto use and parking. However, if the minimum is too low relative to actual parking demand, "spillover" parking might result. In the case of commuters, they may park in neighborhoods or retail areas or on street at meters and timed zones as a result of insufficient off-street parking. Consequently, important adjuncts to parking minimums are preferential parking for residents, enforcement against meter feeding and parking over time limits in timed zones.

The effectiveness of reduced parking requirements also depends on how developers respond. Developers and lenders may choose not to provide the minimum if they perceive it as too low relative to demand, or if the alternative to providing the minimum is not attractive.

Effectiveness Experience: Experience suggests this strategy has had mixed results in attracting developers to reduce parking supply. For example:

- Few developers in Seattle, WA or Hartford, CT opted for reduced minimum requirements in return for additional carpool stalls, transit pass sales, contribution to the in-lieu fund or peripheral parking[4].

- Chicago, IL offers reductions in the amount of required parking for buildings connected to underground transit stations and for underground pedestrian circulation. Developers take advantage of reduction for connections but not for pedestrian circulation claiming it is too expensive to do so[5]. Orlando, FL experienced the same unwillingness to reduce parking below the minimum, in this case in return for contributions to a transportation management trust fund[6].

Compliance with Ordinances, Codes: Parking reduction ordinances specify terms and conditions under which reductions are granted. See section on Administration.

B. HUMAN RESOURCES

Human resources are needed for several functions. Localities require personnel time to review developer proposals for parking reductions, grant reductions and negotiate binding agreements. Localities also will require human resources to monitor developer compliance. In the case of in-lieu fees, localities must monitor fee collection and expenditures to insure program revenues are adequate and allocated for intended purposes in timely fashion. See Fee Collection under Administration.

Developers and employers will incur human resource obligations in the management of travel demand management programs. Usually, a Transportation Coordinator is assigned to implement the program, carry out periodic surveys of commuters to track program performance and report to the relevant jurisdiction.

C. ADMINISTRATION

Policy: Zoning codes specify terms and conditions for reductions. For example, the code might specify the proportion or percent of spaces which can be reduced for such specific programs as designated carpool stalls, transit pass sales or on site carpool matching services. Where conditions are more complex or tailored to very large developments, a developer agreement is sometimes used to specify developer obligations. It is important to insure that agreed to programs continue beyond a change in property ownership. A land covenant may be used for this purpose.

Fee Collection: In-lieu fee programs present special administrative issues. Fee collection and expenditures on promised transportation or parking programs must be credible and prompt to encourage developer contributions. In the case of Calgary, Canada, developers objected to the program because promised municipal parking structures peripheral to downtown were slow to develop[7].

Eligibility: The parking reduction program may be applicable only in certain areas or for certain uses or only if tied to specific travel reduction measures. Code policies should be clear on all eligibility requirements.

Reporting: Jurisdictions with parking reduction provisions in zoning codes should insure that developers report on the status of agreed to travel reduction actions and/or in-lieu payments. Such reports should be collected by code enforcement departments and spot checked.

Policy Coordination: Reduced parking requirement policies should be coordinated with local travel demand management programs and enforcement of on-street controls. Specifically, the travel demand options encouraged by reduced parking requirements ought to be the same as those encouraged by trip reduction ordinances or programs. Also, on-street controls should support parking supply restrictions to guard against potential spillover of commuters into retail and neighborhood areas.

Cost/Revenues: Developers taking advantage of reduced parking requirements will reduce capital investment in garages and surface lots. As previously indicated, a developer building 1,000 fewer surface spaces around an office building might enjoy amortized annual savings of about $95,500 per year, assuming a 30 year time period and 10 percent discount rate. Operations and maintenance savings might be $100 per space per year, for a total savings of $100,000.

On the cost side, developers and/or employers will incur the cost of a travel demand management program, presuming the parking reduction code or agreement calls for implementation of such a program. Typically, the private sector incurs the cost of designating a transportation coordinator, carrying out annual surveys, implementing travel demand management strategies and reporting to a public jurisdiction. According to a recent review of employer based programs, employer costs can range from $10 to $60 per year per employee[8].

Private employers or developers may finance programs in one of two ways. Either they assume the cost of the programs themselves, or they pay a fee to a contractor or Transportation Management Association for the service. TMAs typically charge a fee for their services based in part on the number of employees served. For example, a Transportation Management Association in the El Segundo, Los Angeles, California area, levies an assessment of $1.25 per employee. The North Bay TMA in Marin and Sonoma counties in California charges an annual fee of $25 per employee up to a maximum of $250 per employer.

D. PHYSICAL FACILITIES

Entrance/Exit Systems: No change is required in entry/exit control systems under this strategy.

Permits/Stickers: No permits or stickers are required except those associated with any preferential parking for carpoolers agreed to as part of the reduction in parking requirements. See previous discussion under the chapter on Preferential Parking.

Signs/Information: No signs or parker information systems are required except those associated with any preferential parking for carpoolers agreed to as part of the reduction in parking requirements. See previous discussion under the chapter on Preferential Parking.

Stall Layouts: No changes to parking lot layouts would be required with this strategy.

Security/Enforcement: No parking security or enforcement facilities are associated with this strategy, except those associated with any preferential parking for carpoolers agreed to as part of the reduction in parking requirements. See previous discussion under the chapter on Preferential Parking.

E. MONITORING AND EVALUATION

Monitoring: Localities agreeing with developers for reduced parking requirements must monitor new developments to insure the agreed to programs (carpool and transit encouragements) or facility improvements (e.g. information displays, carpool stalls, bus turn outs, bike racks) are provided. In one study of compliance under such developer agreements, Sacramento County found "very few" had implemented the required facilities[9]. Of course, if the agreement involves payment of an in-lieu fee, checking compliance is a simple matter of verifying payment.

Evaluation: Localities should assess program effectiveness in two ways. One, by assessing the proportion of developers taking advantage of reduced requirement provisions. Two, by evaluating the effectiveness of the resulting travel demand management programs and facilities. Employee surveys can be used to determine the use of bike racks, bus turn outs, carpool stalls and information displays. Ideally, a good evaluation ought to determine the proportion of transit users, carpoolers, bicyclists and walkers at developments agreeing to travel demand management programs and compare the results with rates at comparable developments without such programs.

1 "America's Suburban Centers: A Study of the Land Use-Transportation Link," Dr. Robert Cervero, University of California at Berkeley, January 1988; also see "Suburban Parking Economics and Policy: Case Studies of Office Work Sites in Southern California," Richard Willson, California State Polytechnic University, for Federal Transit Administration, 1992.

2 Parking Policy Report, Governor's Commute Trip Reduction Task Force, Seattle, Washington, March 1992.

3 "Model Parking Code Provisions to Encourage Ridesharing and Transit Use," for FHWA, Steven Smith, JHK Associates, September 1983; "Innovations in Parking Management," for the Urban Mass Transportation Administration, Public Technology, Inc., Washington, D.C., 1982.

4 "Parking Management and Traffic Mitigation in Six Cities: Implications for Local Policy," Thomas J. Higgins, K.T. Analytics, Inc., Paper presented before the Transportation Research Board, January 1989.

5 Public Technology, Inc., Op. Cit.

6 "Ten Cities' Strategies for TDM," Carolyn Flynn and Lawrence Glazer, in Transportation Research Record No. 1212, Transportation Research Board, Washington, D.C., 1989.

7 "Auto Parking Trends," Wilbur Smith, Planning Magazine, American Planning Association, June 1983.

8 Transportation Control Measure Information Documents, Cambridge Systematics, Inc., March 1992.

9 Trip Reduction Program Evaluation Study, Sacramento County Planning Department, September, 1988.

II

PARKING SUPPLY STRATEGIES

PARKING MAXIMUMS

Definition: Limits the amount of parking developers may provide as specified in zoning codes.

A. PLANNING

How It Works: Localities control parking supplies through the zoning code. Usually, parking codes establishing the least amount of parking developers must provide ("minimum" required). Localities can set maximums (the "most" developers may provide) to insure that a surplus is not provided. Such maximums may be in addition to minimums or stand alone.

Most Applicable Contexts: Best prospects for reductions in auto use through parking maximums are similar to those for reduced minimums (previous chapter):

- Developer and lender preferences or minimum parking codes result in more parking than is utilized. In such settings, minimums might be lowered and new maximums developed if code requirements are the cause of overly ample supplies.
- Mixed uses are available or planned where parking supplies can be shared. In this setting, localities can develop maximums for parking supplies serving several compatible uses instead of separate and more extensive supplies serving each use.
- Commercial and public parking is well utilized, thereby limiting opportunities for parkers to simply shift parking locations as supplies are tightened.
- Transit capacity is frequent and not saturated, offering a good alternative for drivers affected by tightened supplies.
- Uncontrolled supplies (streets, vacant land, neighborhoods) are at a minimum or new controls and or enforcement are planned.

One candidate for maximums may be lower density, suburban areas. As discussed under reduced parking minimums (previous chapter), supplies in these communities tend to exceed demand[1]. These same communities also may be sites for new mixed use developments where parking can be shared across uses.

More dense urban areas also may provide opportunities. Here, the high cost of parking may encourage developers to support new maximums. Or, if parking subsides are to be reduced or cashed out, parking maximums might be reduced to be more in line with new anticipated parking demand. Finally, parking maximums might be reduced in proximity to transit stations where employee transit use may reduce parking demand, especially in suburban and lower density situations where evidence suggests parking supplies often are overly ample.

Examples: Overall, use is limited to a few localities. Examples include: Seattle, Bellevue, and Redmond WA; Portland, OR; San Francisco, CA; Toronto and Vancouver, Canada[2]. A recent survey of 127 zoning ordinances across the United States found only one jurisdiction employing maximums, Bellevue, Washington[3]. A new state trip reduction law in Washington encourages adoption of maximums in all city and county codes, and King, Snohomish and Spokane counties in Washington are proposing maximums[4]. Maximums have been studied in detail and are recommended for adoption in Honolulu, Hawaii both for downtown and Waikiki[5].

Keys to Effectiveness: As with reduced parking minimums, the intended effect of reduced parking minimums is less solo driving and increased use of transit, carpools, walking and cycling. Effectiveness depends on how the supply resulting from the policy relates to parking demand. In the best case, the tight supply encourages less auto use and parking. However, if the maximum is too low relative to actual parking demand, "spillover" parking might result, such as commuters who park in neighborhoods or retail areas or on street at meters and timed zones as a result of insufficient off-street parking.

It is not a simple matter to accurately estimate parking demand and set maximums accordingly. For example, in Portland, Oregon several building developers have provided considerably less than the maximum, raising the issue of whether the maximum is perhaps set too high. Several developers provide one space per 1,200 square feet where the maximum is one space per 1,000 square feet[6]. As with reduced minimums, important adjuncts to parking maximums are preferential parking for residents, enforcement against meter feeding and parking over limits in timed zones.

There is an important difference between reduced parking minimums and parking maximums when it comes to the consequences of incorrectly estimating parking demand. Reduced minimums allow developers the choice of providing the minimum or something more than the minimum. However, maximums are an absolute limit on the amount of parking which may be provided. Thus, even if a local minimum zoning code underestimates the amount of parking required for developments, developers and lenders have the opportunity to make a closer estimate of demand and provide more than the minimum. Maximums are not so tolerant of errors in estimated parking demand. If a locality underestimates parking demand and sets maximums too low, developers cannot "second guess" the jurisdiction and provide more parking.

Effectiveness Experience: Effectiveness of parking maximums has not been well evaluated. Experience in two cities with maximums suggests the policies possibly are effective in increasing or maintaining transit use, but other important variables are at work in both cities which confound the picture:

- Bellevue, WA, with a maximum for office use, has shown an increase in transit ridership from 4 percent in 1980 to 11 percent in 1992[7]. However, over the same period as the maximums came into effect, transit service has been increasing, a transit center developed, local street HOV lanes were added, and parking prices have been increasing.

- Seattle, WA has maintained a relatively high transit share downtown of 45%[8] while imposing a maximum requirement of one space per 1,000 square feet. However, at the same time, the City has imposed requirements on developers to encourage transit and improved transit service in the downtown.

Compliance with Ordinances, Codes: Parking maximum ordinances specify allowable parking supplies, usually by type of use and area. See section on Administration.

B. HUMAN RESOURCES

Human resources are needed to administer and monitor maximum code provisions. Localities require personnel time to review developer plans and check them against code requirements. Localities also will require human resources to monitor developer compliance. Monitors must check developments to insure no more than the maximum supply is provided.

Finally, human resources are needed to evaluate maximum policies over time. The evaluation should track whether developers are providing at or well under the maximum as well as transit and rideshare rates for the effected zone as the policy takes effect. Personnel time might also be involved in managing any rigorous evaluations entailing consultants or university researchers. See section on Monitoring and Evaluation.

C. ADMINISTRATION

Policy: Zoning codes specify maximum terms and conditions for reductions. For example, the Bellevue maximum ranges from 2.7 to 3.5 spaces per 1,000 square feet depending on the zone within the downtown. For complex projects, a developer agreement might specify allowed parking at development phases with the aim of achieving no more than the maximum in the final phase.

Maximum policies may be phased over time. The Bellevue, WA program provides for a reduction in both the minimum and maximum of 0.3 spaces/1,000 sf every two years. However, the city has not implemented the reductions as less than anticipated transit service has developed[9].

Fee Collection: Parking maximums generally entail no fee collection.

Eligibility: Projects may be eligible for application of maximums only in certain zones. Zones might be established based on degree of transit service, type of use and expected employee densities, as well as variations in carpool, walk and cycling rates. Also, eligible uses may include only office and commercial uses, or maximums may extend to retail, mixed use and residential uses.

Reporting: Jurisdictions with parking maximums usually do not require any regular reporting on the part of developers. However, a one-time developer report may be required to certify that no more than the allowable spaces have been developed. Such reports should be collected by code enforcement departments and spot checked.

Policy Coordination: Maximums should be coordinated with local travel demand management programs and enforcement of on-street controls. Specifically, maximums might apply at least to the same area as targeted by the travel demand management program. Also, on-street controls should be implemented in order to support maximums by guarding against potential spillover of commuters into retail and neighborhood areas.

Cost/Revenues: Developers required to provide less parking than under usual minimum requirements will reduce capital investment in garages and surface lots. As previously indicated, a developer building 1,000 fewer surface spaces around an office building might enjoy amortized annual savings of about $95,500 per year, assuming a 30 year time period and 10 percent discount rate. Operations and maintenance savings might be $100 per space per year, for a total savings of $100,000.

D. PHYSICAL FACILITIES

Entrance/Exit Systems: No change is required in entry/exit control systems under this strategy.

Permits/Stickers: No permits or stickers are required.

Signs/Information: No signs or parker information systems are required.

Stall Layouts: No changes to parking lot layouts would be required with this strategy.

Security/Enforcement: No parking security or enforcement facilities are associated with this strategy.

E. MONITORING AND EVALUATION

Monitoring: As with any parking requirement, monitoring developments is required to insure no more than the maximum is provided. Where the maximum is coupled with special agreements or ordinances requiring developer and/or employer travel demand management programs, then monitoring must insure the programs (carpool and transit encouragements) or facility improvements (e.g. information displays, carpool stalls, bus turn outs, bike racks) are provided.

Evaluation: As with reductions in parking minimum requirement (see previous chapter), it is important to assess the potential effect of maximum policies in two ways. One, by assessing the proportion of developers providing at or below the maximum specified in the code. An effective policy will not be accompanied by developers providing much less than the maximum. Two, localities should attempt to evaluate the effect of maximums on local travel demand management efforts. At the least, maximums should not be associated with much spillover parking into retail areas, or shuffling of cars in meter and timed zones, or other adverse parking impacts (See chapter on on-street controls for ways to monitor such effects). Ideally use of transit and ridesharing in the affected zones should be steady if not increasing as maximums come into effect, assuming other outside influences on these modes (such as gasoline prices, transit fare changes, and economic activity) are stable. Employee surveys can be used to determine commuter mode use to and from work in the affected zones. A thorough evaluation ought to compare trends in transit and ridesharing in zones with and without maximum policies and attempt to deduce effects of the policy over time.

1 "America's Suburban Centers: A Study of the Land Use-Transportation Link," Dr. Robert Cervero, University of California at Berkeley, January 1988; also "Suburban Parking Economics and Policy: Case Studies of Office Work Sites in Southern California," Richard Willson, California State Polytechnic University, for Federal Transit Administration, 1992.

2 "Model Parking Code Provisions to Encourage Ridesharing and Transit Use," for FHWA, Steven Smith, JHK Associates, September 1983; Parking Policy Report, Governor's Commute Trip Reduction Task Force, Seattle, Washington, March 1992.

3 "Off Street Parking Requirements: A National Review of Standards," American Planning Association, Planning Advisory Service Report No. 432, 1991.

4 Governor's Commute Trip Reduction Task Force, Op. Cit

5 "Transportation Systems Management Study," for Oahu Metropolitan Planning Organization, Wilbur Smith Associates, K.T. Analytics, Inc. and Lacayo Planning, August 1993.

6 "Parking Management and Traffic Mitigation in Six Cities: Implications for Local Policy," Thomas J. Higgins, K.T. Analytics, Inc., Paper presented before the Transportation Research Board, January 1989.

7 "Parking Management Case Studies," for the City of Boulder, Central Area Improvement District Parking and Financial Study, Draft Report, TMS Inc., Pasadena, California, 1992.

8 Higgins, Op. Cit.

9 TMS Inc., Op. Cit.

II
PARKING SUPPLY STRATEGIES

AREAWIDE PARKING CAPS

Definition: Limits the total supply of parking in an area.

A. PLANNING

How It Works: Locality can limit overall supply of parking in an area through combined policies targeted to an overall cap. A parking management plan and policy, for example, might set maximum parking ratios, forbid construction of free standing garages or even surface lots, allow construction of new buildings without parking and revise pricing structures in public facilities all with the intent of limiting both the demand for and supply of long term parking.

Most Applicable Contexts: Best prospects for reductions in auto use through areawide controls are where some or all of the following conditions apply:

- Developer and lender preferences or minimum parking codes result in more parking than is utilized. In such settings, areawide caps are one way to reduce overly ample supplies.
- Commercial and public parking is well utilized, thereby limiting opportunities for parkers to simply shift parking locations as supplies are tightened.
- Transit capacity is frequent and not saturated, offering a good alternative for drivers affected by tightened supplies.
- Uncontrolled supplies (streets, vacant land, neighborhoods) are at a minimum or new controls and/or enforcement are planned.

As with other supply limit approaches (see previous chapters), one candidate for caps may be lower density, suburban areas. As discussed under reduced parking minimums, supplies in these communities tend to exceed demand[1]. These same communities also may be sites for new mixed use developments where parking can be shared across uses.

More dense urban areas also may provide opportunities. The high cost of parking, new programs to reduce or cash out parking subsidies, or new transit service may provide opportunities for implementation of parking caps.

Examples: Overall, there is very little use of this policy in cities. Examples include: Portland, OR; San Francisco, CA and Boston, MA. Caps do not appear to be under consideration in any cities at this time.

Keys to Effectiveness: The supply of parking in an area is one determinant underlying commuter choice of travel mode. Generally, the tighter the parking supply, the more likely drivers will consider using alternative modes. The relevant "supply" includes all available parking to commuters, both on and off-site within walking distance.

Evidence for the importance of parking supply comes from two recent studies:

- One review of demand management programs in Seattle found both price and availability of parking were important determinants to the proportion of solo drivers. However, comparing buildings with relatively high parking prices and good transit service, but differing in terms of the availability of parking, the study found the most solo driving where parking was ample[2].

- Likewise, a recent study of parking and transit use at San Francisco hospitals found parking price the single most important determinant, "accounting for up to 80 percent of the variation in mode splits among six institutions." However, the availability of off-site parking and nearby transit service were next most important in determining the degree of employee auto use[3].

As with reduced parking minimums or parking maximums, the intended effect of a cap policy is less solo driving and increased use of transit, carpools, walking and cycling. Effectiveness depends how the supply resulting from the policy relates to parking demand. In the best case, the tight supply encourages less auto use and parking. However, if the supply is too low relative to actual parking demand, "spillover" parking might result, such as commuters who park in neighborhoods or retail areas or on street at meters and timed zones as a result of insufficient off-street parking. As with all supply controls, important adjuncts to the cap are preferential parking for residents, enforcement against meter feeding and parking over limits in timed zones.

Effectiveness Experience: Experience with parking cap policies has been limited and mixed with other transportation policies making it difficult to determine effectiveness with confidence. Portland and San Francisco provide the two relevant cases where it appears the policies possibly are effective in increasing or maintaining transit use. However, the parking cap in Boston does not appear effective:

- Portland, OR: In 1975, the city set an overall cap of approximately 40,000 parking spaces downtown, including existing space, approved but not built spaces and a remainder termed "reserve" from which space for new development is allocated. The cap moved up to about 44,000 spaces by the late 1980's, and has moved up again recently with the implementation of new simultaneous efforts (termed "offsets") to reduce vehicular traffic. Thus, the case represents a moving rather than fixed cap. And combined with the policy are transit improvements, new employer work hour programs, carpool and transit promotions. The City is generally satisfied with its parking policies and believes it has helped increase transit use from 20 to 25 percent in the early 1970's to a level of 48 in recent years. The carpool rate is 17 percent[4].

- San Francisco, CA: The City "Transit First" policy allows parking to consume only up to seven percent of a building's gross floor; new buildings must have an approved parking plan prior to receiving an occupancy permit. In some cases, only short term parking is approved; in another, a mix of long, short and carpool parking was approved. City planners indicate there has been no major increase in peak traffic over the past ten years in spite of considerable office growth. Local transit ridership is steady. A 1983 survey of workers in the downtown (C-3 zone) showed 60 percent ride transit, 16 percent rideshare and 17 percent drive alone[5].

- Boston, MA: In 1977, the City of Boston adopted a freeze on commercial parking open to the public, not parking reserved for individuals or a company use within office buildings. While the number of commercial spaces have not increased, there has been a 26 percent increase in exempt spaces between 1984 and 1987 alone. Traffic has increased dramatically along major corridors to the city[6].

Compliance with Ordinances, Codes: Parking cap ordinances specify allowable parking supplies, usually by type of use and area. See section on Administration.

B. HUMAN RESOURCES

Implementing a comprehensive cap policy requires considerable human resource commitments. Periodic parking surveys, studies, plan and policy updates may be needed to make ongoing decisions about the overall level of the cap, how to allocate the allowed inventory by zone (Portland allocates its "inventory" over several zones), what exemptions to allow and how the cap should vary over time in light of air quality regulations and new programs to reduce traffic. Clearly the administrative, planning and decision making requirements are more complex and demanding than those associated with implementing maximum or minimum parking code policies (See previous chapters). Additionally, commercial and development interests are certain to exert periodic pressures to increase the supply or broaden exemption, as has taken place in Boston and Portland.

Finally, human resources are needed to evaluate caps over time. The evaluation must track the inventory of parking space as well as transit and rideshare rates for the effected zone as the policy takes effect. Personnel time might also be involved in managing any rigorous evaluations entailing consultants or university researchers. See section on Monitoring and Evaluation.

C. ADMINISTRATION

Policy: A downtown parking plan is the usual enabling policy. It may contain not only a formal or informal cap, but parking code provisions such as maximums and minimums; requirements for site specific parking plans; prohibitions on free standing garages; parking rate schedules for municipal parking garages; and other provisions. Supplementing the policy, especially for complex and large new developments, might be developer agreements specifying particular parking conditions.

Fee Collection: Parking caps generally entail no fee collection.

Eligibility: Projects will fall under the cap only within capped zones. Zones might be established based on availability of parking supply and utilization; degree of transit service; type of use and expected employee densities; as well as transit, carpool, walk and cycling rates. Parking subject to or eligible for consideration under the cap is another important issue. Will the cap apply to all parking, or only off-street public and private parking open to the public?

Reporting: Jurisdictions with parking caps usually do not require any regular reporting on the part of developers. However, a one-time developer report may be required to certify that no more than the allowable spaces have been developed. Such reports should be collected by code enforcement departments and spot checked.

Policy Coordination: Caps should be coordinated with local travel demand management programs and enforcement of on-street controls. Also, on-street controls should be implemented to support maximums by guarding against potential spillover of commuters into retail and neighborhood areas.

Cost/Revenues: Developers required to provide less parking than under usual minimum requirements will reduce capital investment in garages and surface lots. As previously indicated, a developer building 1,000 fewer surface spaces around an office building might enjoy amortized annual savings of about $95,500 per year, assuming a 30 year time period and 10 percent discount rate. Operations and maintenance savings might be $100 per space per year, for a total savings of $100,000.

D. PHYSICAL FACILITIES

Entrance/Exit Systems: No change is required in entry/exit control systems under this strategy.

Permits/Stickers: No permits or stickers are required.

Signs/Information: No signs or parker information systems are required.

Stall Layouts: No changes to parking lot layouts would be required with this strategy.

Security/Enforcement: No parking security or enforcement facilities are associated with this strategy.

E. MONITORING AND EVALUATION

Monitoring: As with any parking requirement, monitoring developments is required to insure parking caps are maintained. Where the cap is coupled with special agreements or ordinances requiring developer and/or employer travel demand management programs, then monitoring must insure the programs (carpool and transit encouragements) or facility improvements (e.g. information displays, carpool stalls, bus turn outs, bike racks) are provided.

Evaluation: As with any parking supply restriction policies (see previous two chapters), it is important to assess the potential effect of caps in two ways. One, by assessing the amount of parking actually provided by zone to determine where is the greatest and least pressure on the cap inventory. An effective policy will not be so restrictive as to lead to endless pressures for exemptions or revisions of the entire cap policy. Two, localities should attempt to evaluate the effect of caps on traffic. At the least, caps should not be associated with much spillover parking into retail areas, or shuffling of cars in meter and timed zones, or other adverse parking impacts (See chapter on on-street controls for ways to monitor such effects). Ideally use of transit and ridesharing in the affected zones should be steady if not increasing as the cap takes hold, assuming other outside influences on these modes (such as gasoline prices, transit fare changes, and economic activity) are stable. Surveys can be used to determine commuter mode use to and from work in the affected zones. A thorough evaluation ought to compare trends in transit and ridesharing in zones with and without the cap and attempt to deduce effects of the policy over time.

1 "America's Suburban Centers: A Study of the Land Use-Transportation Link," Dr. Robert Cervero, University of California at Berkeley, January 1988; also "Suburban Parking Economics and Policy: Case Studies of Office Work Sites in Southern California," Richard Willson, California State Polytechnic University, for Federal Transit Administration, 1992.

2 The 1987 Evaluation of Transportation Management Programs, Final Report, Mike Lent and Elizabeth Rankin, Seattle Commuter Services, 1987.

3 "Factors Affecting TDM Programs Effectiveness at Six San Francisco Institutions," Dr. Richard Dowling, Dowling Associates, Paper before the 70th annual meeting of the Transportation Research Board, January 1991.

4 "Parking Management and Traffic Mitigation in Six Cities: Implications for Local Policy," Thomas J. Higgins, K.T. Analytics, Inc., Paper presented before the Transportation Research Board, January 1989.

5 Higgins, Op. Cit.

6 Transportation Control Measure Information Documents, for U.S. Environmental Protection Agency, Cambridge Systematics, Inc., March 1992.

III

PARKING PRICING STRATEGIES

VEHICLE OCCUPANCY PRICING

Definition: Impose or increase parking fees on solo drivers; discount carpool and vanpool parking.

A. PLANNING

How It Works: Provides disincentive for solo driving and/or incentive to ridesharing by increased or decreased parking fees. Rates for solo drivers may be set at or above market rates; carpool and vanpool rates may be discounted or free.

Most Applicable Contexts: The strategy can be implemented by either the private or public sector in off-street lots and garages (see subsequent section on on-street pricing). It is especially appropriate in areas with parking pricing, but with no occupancy rate differentials; where parking is free to all parkers, but is costly to provide; where the parking supply is well utilized or allocated by wait list; where there are pressing needs to reduce traffic and associated pollution problems. Generally, then, it applies in more dense urban areas with an existing market in parking.

Best candidate applications are those public garages where rates have fallen behind commercial parking rates, and where these rates offer no differentials for carpoolers. Also applicable in private sector commercial facilities without carpool specials and at employment sites depending on current rate structures in leased or owned facilities.

Other variables favoring application of the measure:

- Competing parking supplies (other private, public, commercial) are well utilized and priced, thereby limiting opportunities for solo drivers to simply shift parking locations.

- Transit capacity is frequent and not saturated, or is soon to be improved, offering a good alternative for drivers affected.

- Uncontrolled supplies (streets, vacant land, neighborhoods) are at a minimum or new controls and or enforcement are planned.

Examples: Overall, there is some use of increased rates for solo drivers; modest usage of discount parking for carpoolers.

In Los Angeles where employer regulations have been in place for several years requiring attention to various trip reduction strategies including parking pricing, less than four percent of the work sites introduced parking pricing as a strategy to encourage ridesharing[1]; however, 16 percent provide free or low cost parking to rideshare patrons[2]. In the San Francisco Bay Area, a survey of the rideshare agency database shows only 1.7 percent of employers offer free parking for carpoolers, with 8.5 percent offering preferential parking of any kind (price or location) for carpools[3].

Keys to Effectiveness: Price increases for solo drivers or discounts for poolers must be sufficient to provide an incentive. Small changes are unlikely to be effective. One study of the relationship between parking price changes and reductions in parking demand (not solo driving or traffic) indicates "elasticities" of -0.3 or less, meaning a ten percent increase in prices may reduce demand by only three percent, and auto use and traffic by something less[4]. Much also depends on employer parking subsidy policies. Where large proportions of employers subsidize employee parking, changes in parking prices will have little effect. Alternative parking availability and price are important. Price changes at one facility may simply shift parkers to others, or to on-street meter feeding or shuffling of cars in timed zones, or to lots intended for shoppers. Discount parking for carpoolers may attract some transit users to carpooling.

Effectiveness Experience: Experience shows pricing of solo drivers can be very effective in reducing solo driving; carpool discount strategies are less effective and possibly ineffective depending on the situation:

- CH2M Hill: Began charging solo drivers $49 per month for parking, the amount the company pays the building owner for parking. All employees receive a $40 per month travel allowance in their paychecks. Carpoolers park for free. Walkers, cyclists and drop offs keep the travel allowance. Solo driving declined from 89 percent to 64 percent after the parking policies were put into place[5].

- Pacific Northwest Bell (now US West): A combination of $60 per month parking for solo drivers, discount parking for carpoolers and limited on-site parking has resulted in a 25 percent drive alone rate among employees, compared to about an average 80 percent drive alone rate for other employers in the area[6].

- City of Seattle: The City reduced parking charges for carpools at two Seattle parking facilities downtown, from $25 to $5 per month at one facility and $0 at another. Twenty five percent of the participants in the program were previous solo drivers, suggesting considerable trip reduction. However, some participants were previous transit users (45 percent) and carpoolers (29 percent), blunting some of the positive effect of pricing[7].

- Caltrans: Discount parking for carpoolers resulted in immediate use of 480 new carpool spaces, but about 90 percent of the spaces were used by existing carpoolers, not previous solo drivers. Of the new carpoolers, about two thirds were previous transit users. As a result, there was an increase of 15 to 20 vehicles into the area and a loss of up to 220 transit users[8].

Compliance with Ordinances, Codes: Travel demand ordinances often encourage attention to these strategies. Developers sometimes are required to implement preferential discounts for rideshare patrons through developer agreements. Less often, such agreements require pricing of solo drivers.

B. HUMAN RESOURCES

Human resources are needed for several functions. If parking collection or attendant personnel already are present, implementing a revised pricing schedule for solo drivers and/or rideshare patrons will not impose significant new administrative burdens. However, where such personnel are not present, then a new parking attendant may be needed for collections at gates or to enforce meters or permits. Personnel time also is needed to determine eligibility and certify legitimate carpoolers for pricing discounts. Spot check monitoring determines if ineligibles are obtaining permits and whether eligible rideshare patrons are continuing to pool. Finally, personnel time is needed to make program modifications and evaluate the program.

Where discount parking for car and vanpools is the only strategy and the number of preferential parkers is small, a Transportation Coordinator can carry out most if not all the necessary functions. In such cases, Coordinators can spot check permit holders to insure legitimate ridesharing. They also can track overall program effectiveness through regular employee transportation surveys. An effective program will show a decline in solo driving and increase in transit and rideshare use, presuming other possible causes of such declines can be ruled out (e.g. changes in gasoline prices).

C. ADMINISTRATION

Policy: Changes in parking pricing rates based on occupancy usually do not require special legislation or clearance of multiple agencies. Public parking authorities may alter rate structures by administrative action. Developers and/or employers can be encouraged to implement pricing through travel demand management ordinances and/or developer agreements. Building lease policy may require revision where parking rates for employees are fixed by terms and conditions.

Fee Collection: Parking charges are collected through parking attendants at gate or by meters or permits. See Physical Facilities section for more information on collection mechanisms.

Eligibility: Eligibility criteria for discount carpool parking are important to establish and enforce. Will a carpool be set at two or more or three or more persons? Will carpoolers be required to arrive in the parking facility with members or are drop offs allowed? Will eligibility hinge on a minimum number of days per week of carpooling?

As with any preferential parking for rideshare patrons, it is advisable to set criteria on the lenient side at the start of a program, then tighten up depending on demand and abuse patterns. For example, two person carpools might be allowed at first, as well as a three day per week minimum with drop off privileges. However, if abuse appears a problem, one or more of these criteria can be tightened.

Reporting: If the jurisdiction has a travel demand management ordinance, an employer may be bound to report regularly on the number of solo drivers and carpoolers. If not, it still is advisable to keep careful records of employee commute mode to facilitate evaluation and support voluntary reporting to the jurisdiction, other employers or local Transportation Management Associations.

Localities requiring preferential pricing at new developments through developer agreements should require reports to insure agreed to pricing schedules are implemented and should spot check such reports. As indicated previously, in one study of developer compliance with travel demand management requirements, Sacramento County found "very few" had implemented the requirements[9].

Policy Coordination: Employers should coordinate with discount carpool parking policies adopted by local jurisdictions. For example, some jurisdictions may encourage carpooling at public lots or employment sites through discount or free parking. It may be wise to be consistent with public policy on eligibility and other matters especially where an employer's parking facilities are close to such public lots. An employer preferential parking program which is less attractive than the preferential program at nearby city or county parking open to the public will detract from use of the employer's program.

Given the potential effectiveness of new or increased parking prices for solo drivers, collateral policies and programs may be important to consider, including:

- Increased transit and carpool services
- Preferential parking for residents in nearby neighborhoods
- Set aside or validated parking for shoppers
- New timed and metered zones around the priced employment sites
- Strong enforcement of timed parking and against meter feeding.

Cost/Revenues: Usually, there is minimal cost in implementing parking price increases or changes at facilities with pricing in place. Costs for changes in notices and accounting operations are minimal. However, if new gated systems are needed for parking garages, costs increase. Card access control systems cost between \$6,000 and \$7,000 per lane, with cashier systems at about \$10,000 per lane for entrances and about \$25,000 per exit lane. If garages or surface lots are fitted with meters, these cost between \$250 and \$400 installed. Electronic boxes are available for controlling large numbers of spaces. Units accepting coins, bills and credit cards cost about \$20,000 (excluding installation). If hang tag permits are used, costs are up to \$3 per tag. New electronic tags (debit cards) are available, which cost about \$30 per unit.

Costs also depend on the degree of rideshare monitoring for rideshare discount programs and whether there already are parking attendants managing garage or lot parking. The employer or building management must either check for carpool permits or monitor occupancy as vehicles arrive in lots and garages. If parking collection or attendant personnel already are present, the added cost of monitoring carpoolers will be small. However, where there are no such personnel, a transportation or parking coordinator must be designated to spot check carpool parking.

Where increased or revised pricing reduces employee parking demand, it may reduce the amount of parking an employer needs to lease from building owners. As previously noted, lease parking per stall may range from \$30 to over \$100 per month in U.S. cities. At least two employers in the case studies (e.g. CH2M Hill and Nuclear Regulatory Commission) were motivated to implement employee parking pricing in part to reduce employee parking demand or live within a tight parking supply.

In the long term, to the extent employee parking demand is reduced through parking pricing, developers will save by reducing the amount of garage and parking lot space necessary to service commuters. As an illustration, suppose the developer is allowed to build 1,000 fewer surface spaces around an office building because of reduced commuter parking demand. As previously indicated, a developer building 1,000 fewer surface spaces around an office building might enjoy amortized annual savings of about \$95,500 per year, assuming a 30 year time period and 10 percent discount rate. Operations and maintenance savings might be \$100 per space per year, for a total savings of \$100,000.

D. PHYSICAL FACILITIES

Entrance/Exit Systems: Generally, vehicle occupancy pricing entails no new entrance or exit systems, only a change in pricing structure. However, where no pricing system exists, one option is to install new gate controls with card access for regular users and permits for occasional users. See Administration for a discussion of costs.

Permits/Stickers: Another option for implementing pricing is through permits or hang tags. Parkers purchase permits or tags at a vending machine or concession outlet and display it on their dash ("pay and display"). Electronic boxes also are available where the parker pays and presses in their stall number without the need to display a permit on their dash. Rideshare patrons would display special discount tags, if discount parking is offered.

Signs/Information: Informational signs and graphics are required, especially for daily fee parkers and carpoolers to communicate prices, discounts, hours of operation, liability assumption and other particulars. If carpools are offered both price discounts and preferential close-in parking, then carpool stalls must be signed.

Stall Layouts: No changes are required.

Security/Enforcement: This strategy requires no additional security systems or hardware. However, additional enforcement is needed to enforce preferential carpool parking. See discussion below on Monitoring and Evaluation.

E. MONITORING AND EVALUATION

Monitoring: The most significant monitoring task is associated with discount carpool parking rather than increased rates for solo drivers. Abuse of preferential parking privileges is not uncommon, especially for long running programs. For example, in 1993 the City of Minneapolis tightened restrictions on its discount carpool parking program to curb abuse[10]. The best preventive measure is simply to require carpoolers to arrive together to be eligible for discount parking. In this way, spot checks can determine compliance immediately. If drop off is allowed, enforcement is much more difficult. In this case, it is necessary to call poolers periodically in an effort to determine if residence or work times have changed and whether they are still carpooling. Such checks are not a full proof deterrent to determined abusers but can cut down the rate of abuse.

Evaluation: Evaluating the impact of parking pricing policies entails a couple of steps. One, regular counts should be done to determine the utilization of parking facilities. Two, employee surveys should be carried out to spot changes in mode and parking location. Such surveys will indicate to what extent pricing may have reduced solo driving, increased carpool and transit use or shifted commuters to new parking locations. By asking those who have switched modes about their prior mode, the survey also should determine the degree to which the program is drawing carpool users from transit, walking and cycling as opposed to solo driving.

1 "Regulation XV: Beginning to Show Results," Giuliano, Genevieve and Martin Wachs. ITS Review, Volume 15, No. 1., November 1991.

2 State of the Commute, CTS, Los Angeles, 1992.

3 "A Re-Examination of Rides' Database," Maria Thayer, RIDES, San Francisco, CA, February 1991.

4 "A Review of the Impact of Parking Policy Measures on Travel Demand," Bernard Feeney, Transportation Planning and Technology, Vol. 13, 1989.

5 Proceedings: Commuter Parking Symposium, Sponsored by Metro and Association for Commuter Transportation, Seattle, Washington, December 1990.

6 "Evaluation of Travel Demand Management Measures to Relieve Congestion," Richard Kuzmyak, Eric Schreffler, Comsis Corporation, for the Federal Highway Administration, February 1990.

7 Maria Olsson and Gerald Miller, "Parking Discounts and Carpool Formation in Seattle," The Urban Institute, 1978.

8 Transportation Control Measure Information Documents, Draft, Cambridge Systematics, Inc., for the U.S. Environmental Protection Agency, October 1991.

9 Trip Reduction Program Evaluation Study, Sacramento County Planning Department, September 1988.

10 "Parking in the News," The Parking Professional, November 1993.

III

PARKING PRICING STRATEGIES

TIME-BASED PRICING

Definition: Impose or increase parking fees on long term parkers, with or without any change in short term parking rates.

A. PLANNING

How It Works: Provides disincentive for long term parking, affecting mostly commuters in major employment centers. Rates may escalate by hours parked in a day and/or be boosted for monthly parkers.

Most Applicable Contexts: Can be implemented by either the private or public sector in off-street lots and garages (see subsequent section on on-street pricing). Especially appropriate in areas with parking pricing, but with flat rate structures; where long term parking rates are simple multiples of short term rates or discounted compared to short term rates; where the parking supply is well utilized or allocated by wait list, while at the same time there are pressing needs to reduce traffic and associated pollution problems. Generally, then, it applies in more dense urban areas and activity centers with an existing market in parking.

Best candidate applications are those public garages where rates have fallen behind commercial parking rates, and where these rates offer no differentials for parking duration. Also applicable in private sector commercial facilities offering "early bird" rates and monthly discounts, and at employment sites depending on rates commuters face in leased or owned facilities.

As with pricing by vehicle occupancy, other variables favoring application of the measure:

- Competing parking supplies (other private, public, commercial) are well utilized and priced, thereby limiting opportunities for solo drivers to simply shift parking locations.
- Transit capacity is frequent and not saturated, or is soon to be improved, offering a good alternative for drivers affected.
- Uncontrolled supplies (streets, vacant land, neighborhoods) are at a minimum or new controls and or enforcement are planned.

Examples: There is little use of increased rates by parking duration and only one known attempt to regulate rates charged by parking operators (see San Francisco example below). In fact, rates tend to be opposite to the structure of this strategy. One national review suggests daily rates charged commuters parking long term generally are one half or less the daily rates charged the occasional user of parking facilities[1].

Keys to Effectiveness: Price increases by duration sufficient to affect parking and travel behavior. Small changes are unlikely to be effective. As noted under the previous chapter on occupancy pricing, parking demand is not very price sensitive, at least long term parking associated with work trips[2]. Much also depends on employer parking subsidy policies. Where large proportions of employers subsidize employee parking, changes in parking prices will have little effect. Alternative parking availability and price are important. Price changes at one facility may simply shift parkers to others, or to on-street meter feeding or shuffling of cars in timed zones, or to lots intended for shoppers.

Effectiveness Experience: Experience indicates mixed results with timed pricing, in some cases a shift to other facilities and parking duration rather than to an alternative to solo driving; however, revenues appear to increase. Limited experience with commercial rate regulation suggests it may be difficult to enforce:

- City of Madison, WI: The City imposed a peak period surcharge of $1.00 at four parking facilities combined with new shuttle service. Five to eight percent of commuters switched to transit. However, 22 percent shifted parking location, and six percent parked after the peak[3].

- City of Chicago, IL: The City raised rates at municipal lots by 30 to 120 percent, bringing all day and monthly fees up to levels at nearby commercial space. The number of cars parked declined 35 percent and parking duration decreased. The number of all day parkers arriving before 9:30 a.m. dropped 72 percent. Parking at nearby commercial parking facilities did not change significantly. Local planners inferred most former long term parkers switched to transit or pooling, or to parking for shorter durations[4].

- City of Eugene, OR: Raised monthly rates at two municipal garages and several surface lots. Rates at garages went from $16 to $30 over about one year. Surface lot rates went up from between $6-16 to $16-34. Meter rates did not change, but fines were increased for commuter parking in short term stalls for shoppers. Monthly parking permit sales declined from 560 to 360 parkers. About half the parkers became carpoolers or rode a free shuttle, the other half apparently changed parking locations[5].

- City of Honolulu, HI: Doubling municipal parking rates to discourage long term parking increased turnover and short term parking by six percent and increased space for shoppers, but had an uncertain effect on solo driving and transit use. Monthly parking revenues increased 36 percent[6].

- San Francisco, CA: Allowed parking rates at new developments are set by the newest parking code revisions. For example, the four hour rate cannot be greater than four times the first hour charge. The eight hour rate cannot be less than ten times the first hour charge. Planners say developers and parking operators have found a way (unspecified) to comply with the letter of the code but not the intent--discouraging long term parking in favor of short term.

Compliance with Ordinances, Codes: Trip reduction ordinances often encourage attention to these strategies as part of a menu of travel demand management strategies. Developers sometimes are required to implement time-based pricing through developer agreements.

B. HUMAN RESOURCES

This strategy presumes a change in exiting parking rate structures. Thus, new parking attendant personnel are not required to implement the strategy. However, personnel time is needed to make program modifications and evaluate the program.

Where time-based price changes are part of a travel demand management program, the Transportation Coordinator managing the program also can track overall program effectiveness through regular employee transportation surveys. An effective program will show a decline in solo driving and increase in transit and rideshare use, presuming other possible causes of such declines can be ruled out (e.g. changes in gasoline prices).

C. ADMINISTRATION

Policy: Changes in parking pricing rates based on duration of parking usually do not require special legislation or clearance of multiple agencies. Public parking authorities may alter rate structures by administrative action. Developers and/or employers can be encouraged to implement the strategy through travel demand management ordinances and/or developer agreements. Building lease policy may require revision where parking rates for employees are fixed by terms and conditions. In theory, local ordinance can be used to prohibit early bird specials at commercial parking facilities, though there are no examples of commercial rate regulation. Finally, local parking codes can regulate rates charged at new developments, as in San Francisco.

Fee Collection: Parking charges are collected through parking attendants at gates or by meters or permits. See Physical Facilities section for more information on collection mechanisms.

Eligibility: Managers must decide on eligibility criteria for exceptions to the pricing program. Often, car and vanpools receive discount parking under this strategy. Rideshare criteria are important to establish and enforce. Will a carpool be set at two or more or three or more persons? Will carpoolers be required to arrive in the parking facility with members or are drop offs allowed? Will eligibility hinge on a minimum number of days per week of car-pooling?

As with any preferential parking for rideshare patrons, it is advisable to set criteria on the lenient side at the start of a program, then tighten up depending on demand and abuse patterns. For example, two person carpools might be allowed at first, as well as a three day per week minimum with drop off privileges. However, if abuse appears a problem, one or more of these criteria can be tightened.

Reporting: If the jurisdiction has a travel demand management ordinance, an employer may be bound to report regularly on the outcomes of travel demand management strategies, especially trends in the number of solo drivers and carpoolers. If not, it still is advisable to keep careful records of employee commute mode to facilitate evaluation and support voluntary reporting to the jurisdiction, other employers or local Transportation Management Associations.

Localities requiring pricing by duration at new developments through developer agreements should require reports to insure agreed to pricing schedules are implemented and should spot check such reports. As indicated previously, in one study of developer compliance with trip reduction requirements, Sacramento County found "very few" had implemented the requirements[7].

Policy Coordination: Employers or developers implementing pricing by duration should coordinate pricing policy with schedules in the area. For example, short term rates probably should not be very different than on-street meter rates for the area. Long term rates for daily or monthly parking should not be dramatically different from the same rates in nearby developments, or else commuters will simply shift to other parking facilities. Ideally, public policy would encourage rate changes over an entire area rather than piecemeal through individual developer agreements.

Given the potential effectiveness of new or increased parking prices for solo drivers, collateral policies and programs may be important to consider, including:

- Increased transit and carpool services
- Preferential parking for residents in nearby neighborhoods
- Set aside or validated parking for shoppers
- New timed and metered zones around the priced employment sites
- Strong enforcement of timed parking and against meter feeding

Cost/Revenues: Usually, there is minimal cost in implementing parking price increases or changes at facilities with pricing in place. Costs for changes in notices and accounting operations are minimal. However, it may be necessary to change software or controllers in garage or surface lot gated systems. If garages or surface lots are fitted with new variable rate parking meters, these cost between $250 and $400 installed. Electronic boxes are available for controlling large numbers of spaces. Many can be programmed to charge escalating rates by parking duration. Units accepting coins, bills and credit cards cost about $20,000 (excluding installation). If hang tag permits are used, costs are up to $3 per tag. New electronic tags (debit cards) are available which cost about $30 per unit.

Costs also depend on whether carpool discounts accompany this strategy. If so, parking attendants or building management must either check for carpool permits or monitor occupancy as vehicles arrive in lots and garages. Presuming parking attendants already are present, the added cost of monitoring carpoolers will be small. However, where there are no such personnel, a transportation or parking coordinator must be designated to spot check carpool parking.

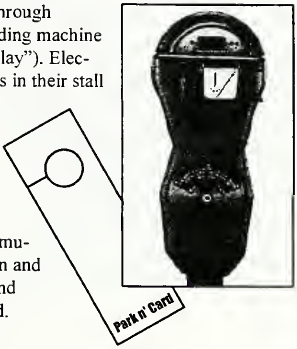
Where increased or revised pricing reduces employee parking demand, it may reduce the amount of parking an employer needs to lease from building owners. As previously noted, lease parking per stall may range from $30 to over $100 per month in U.S. cities. At least two employers who altered parking pricing (e.g. CH2M Hill and Nuclear Regulatory Commission) were motivated to implement employee parking pricing in part to reduce employee parking demand or live within a tight parking supply. (See chapter on Vehicle Occupancy Pricing).

In the long term, to the extent employee parking demand is reduced through parking pricing, developers will save by reducing the amount of garage and parking lot space necessary to service commuters. As an illustration, suppose the developer is allowed to build 1,000 fewer surface spaces around an office building because of reduced commuter parking demand. As previously indicated, a developer building 1,000 fewer surface spaces around an office building might enjoy amortized annual savings of about $95,500 per year, assuming a 30 year time period and 10 percent discount rate. Operations and maintenance savings might be $100 per space per year, for a total savings of $100,000.

D. PHYSICAL FACILITIES

Entrance/Exit Systems: Generally, vehicle temporal pricing entails no new entrance or exit systems, only a change in pricing structure. However, where no pricing system exists, one option is to install new gate controls with card access for regular users and permits for occasional users. See Administration for a discussion of costs.

Permits/Stickers: Another option for implementing pricing is through permits or hang tags. Parkers purchase permits or tags at a vending machine or concession outlet and display it on their dash ("pay and display"). Electronic boxes also are available where the parker pays and enters in their stall number without the need to display a permit on their dash. Both types of systems can be programmed to accept escalating rates. Rideshare patrons would display special discount tags, if discount parking is offered.



Signs/Information: Informational signs and graphics are required,especially for daily fee parkers and carpoolers to communicate prices, discounts, hours of operation, liability assumption and other particulars. If carpools are offered both price discounts and preferential close-in parking, then carpool stalls must be signed.

Stall Layouts: No changes are required.

Security/Enforcement: This strategy requires no additional security systems or hardware. However, additional enforcement is needed to enforce preferential carpool parking. See discussion below on Monitoring and Evaluation.

E. MONITORING AND EVALUATION

Monitoring: The most significant monitoring task is associated with discount carpool parking rather than increased rates for long term parkers. Abuse of preferential parking privileges is not uncommon, especially for long running programs. The best preventive measure is simply to require carpoolers to arrive together to be eligible for discount parking. In this way, spot checks can determine compliance immediately. If drop off is allowed, enforcement is much more difficult. In this case, it is necessary to call poolers periodically in an effort to determine if residence or work times have changed and whether they are still carpooling. Such checks are not a full proof deterrent to determined abusers but can cut down the rate of abuse.

Evaluation: Evaluating the impact of parking pricing policies entails a couple of steps. One, regular counts should be done to determine the utilization of parking facilities by both long and short term parkers. Two, employee surveys should be carried out to spot changes in mode and parking location. Such surveys will indicate to what extent pricing may have reduced solo driving, increased carpool and transit use or shifted commuters to new parking locations. By asking those who have switched modes about their prior mode, the survey also should determine the degree to which the program is drawing carpool users from transit, walking and cycling as opposed to solo driving.

1 "National Parking Survey," Urban Transportation Monitor, Vol. 7, No. 6, April 2, 1993.

2 "A Review of the Impact of Parking Policy Measures on Travel Demand," Bernard Feeney, Transportation Planning and Technology, Vol. 13, 1989.

3 Charles River Associates, "Madison Peak Period Parking Pricing Demonstration," U.S. Department of Transporation, 1984.

4 R.C. Kunze, et. al., "Impacts of Municipal Parking Fee Increases in Downtown Chicago," Paper presented before the 59th Annual Meeting of the Transporation Research Board; also, Gerald Miller and Thomas Higgins, "Implementing Parking Pricing Strategies," The Urban Institute, 1983.

5 Peat, Marwick, Mitchell and Co., "West University Neighborhood Parking Pricing Demonstration Program in Eugene, Oregon," Final Report, July 1985.

6 "Study of Parking Management Tactics Volume III: A Reference Guide," John DiRenzo et al., Peat, Marwick and Mitchell, December 1979.

7 Trip Reduction Program Evaluation Study, Sacramento County Planning Department, September 1988.

III
PARKING PRICING STRATEGIES

REVISE/INITIATE PARKING TAXES

Definition: Impose or increase parking taxes on providers of parking, whether providers of commercial garages and lots open to all, or owners of office or other building uses with parking devoted to tenants.

A. PLANNING

How It Works: Parking tax influences rates charged by parking providers, possibly raising rates for commuters and other long term parkers. Such rate changes may encourage use of transit, carpooling and other alternatives to solo driving.

Most Applicable Contexts: Most applicable where parking taxes on providers of parking already are in place, as opposed to situations where a new tax is needed. Most often applied on providers of commercial parking rather than owners of parking lots and garages in office, industrial or retail developments. Most appropriate where parking supply is well utilized and where parking pricing already is in place. May apply to both public and private sector. Generally, then, applies in more dense urban areas and activity centers with an existing market in parking.

Examples: Several localities employ parking taxes as a revenue raising device, but without regard to the pattern of vehicle parking; however, one state has recently passed legislation enabling localities to employ parking taxes specifically for affecting vehicle use.

- Parking taxes are in place in Baltimore, Chicago, New York, Pittsburgh, San Francisco and Washington, D.C. Most are based on parking income, though Chicago imposes a tax on daily, weekly and monthly vehicles parked. The taxes are aimed at commercial parking operators, i.e. those charging a fee for parking and open to the public. Building owners providing parking to employees of tenants where no fee is charged for parking are not included.

- Montgomery County (MD) tried to pass a tax of $120 per year per space on employer provided parking, both public and private, irrespective of whether the spaces carried a charge. The proposal failed because of its perceived "anti-business" connotation[1].

- The State of Washington recently passed legislation enabling localities to charge a parking tax directly on the user rather than the provider of parking, in which case the parking operator collects the tax but is not directly affected by it. Localities are allowed to scale or vary the parker tax by the duration of parking, time of entry and exit, vehicle occupancy and other purposes in line with reducing auto use and congestion. Unlike other parking taxes, it may be imposed on employee and commuter parking in nonresidential developments (e.g. office and industrial sites) where there is no fee to the user. Under the law, tax revenues cannot go to general funds. They must go toward transportation purposes[2]. To date, only Seatac Airport has adopted a tax based on the legislation, but the tax is for revenue raising purposes and not geared to the occupancy or duration of parked vehicles[3].

As with any measure intended to influence parking rates charged to commuters and long term parkers, other variables favoring application of the measure:

- Competing parking supplies (presuming tax is directed to only one type of parking or zone) are well utilized and priced, thereby limiting opportunities for solo drivers to simply shift parking locations.
- Transit capacity is frequent and not saturated, or is soon to be improved, offering a good alternative for drivers affected.
- Uncontrolled supplies (streets, vacant land, neighborhoods) are at a minimum or new controls and or enforcement are planned.

Keys to Effectiveness: Parking operators must pass through some or all the tax to long term parkers for the strategy to be effective. Thus, the form of tax is crucial. A general tax on revenues (e.g. gross receipts) or excise tax on parking spaces or even on vehicles may not boost rates on long term parkers or commuters. In fact, an increase in these forms of taxes is likely to boost short term rates as much or more than long term rates, given most operators discount long term parking[4]. Even where long term rates are increased as a result of the tax, the price increases must be sufficient to influence parking and travel behavior. Small changes in prices are unlikely to be effective. As noted under the section on occupancy pricing, parking demand is not very price sensitive, at least long term parking associated with work trips[5]. Much also depends on employer parking subsidy policies. Where large proportions of employers subsidize employee parking, changes in parking prices brought about by taxes on operators will have little effect. Alternative parking availability and price are important. Where taxes are aimed at only one sector of the parking market or one zone, resulting price changes at one facility may simply shift parkers to others, or to on-street meter feeding or shuffling of cars in timed zones, or to lots intended for shoppers.

Effectiveness Experience: Only one careful evaluation of parking tax increase appears in the literature. It suggests a small impact on parking demand, probably little effect on traffic but significant effect on parking operator revenues and City tax income. The City of San Francisco increased rates at public (and commercial) facilities through a 25 percent tax. The number of cars parked declined at seven facilities but increased at six others. Overall, the number of parked cars declined about two percent, suggesting fairly substantial increases in parking taxes may be needed to reduce parking demand, and the effects will vary depending on location. The larger effect was in terms of revenues. Parking industry gross revenues declined 31 percent from the year before the tax, and gross revenues to the City amounted to $5.5 million per year[6].

Compliance with Ordinances, Codes: Parking taxes are established by local ordinance. Non-compliance is defined in ordinance along with penalties.

B. HUMAN RESOURCES

The human resource issues associated with implementing parking taxes are complex. Depending on how the tax is applied, parking operators have to file a tax return form identifying parking facilities, rates charged, number of spaces, and proportion of lease parking or long term parking. Depending on the expected volume of returns and the tax collection burden, reports and collection might occur annually or quarterly.

If the tax were to fall on the user rather than the provider of parking, implementation complexities increase. One issue pertains to collections. At the least burdensome level for the public sector, parking operators would be required to collect the tax. Operators might be required to post notice of the tax, separate it from parking fees and collect. If long term parking is the focus of the tax, it might be collected only from parkers on monthly leases or those parking over four hours. Another option is for the public sector to sell special permits for all long term parking in certain zones and facilities. In this case, permit sales might be through government offices and retail stores on a commission basis. Parking enforcers would monitor long term parkers for display of the permit.

Implementation of the user tax by either of these options will require monitoring and auditing. If operators are responsible for charging and collecting the tax, they can avoid charging some or all of the tax by reporting fewer numbers of long term parkers than actually park in the facility. Or they may lower their rates as an offset to the tax, depending on their desire to be competitive in the parking market. Operators of surface lots without attendants pose a special problem. Legislation might require these lots to have attendants. Or, a permit might be required for parking long term in these lots. Several electronic parking meters on the market now issue such permits ("pay and display" systems).

A parking permit system operated by the public sector avoids the problems associated with operators administering and collecting the tax. However, such a system involves certain complexities. One, it requires both public and private sale outlets. United States experience with parking permit sales and distribution through retail and public offices is limited. Eugene, Oregon, Santa Cruz County and the City of Hermosa Beach in California require and distribute parking permits. Distribution is through retail establishments and public offices. Of course, State lottery tickets as well as fishing and hunting licenses also are sold through retailers. Outside the United States, parking permit systems with retail distribution are found in Ireland, Scandinavia, France and Israel. Consequently, large scale sale and distribution should be manageable. A second complexity associated with permits relates to enforcement. Presuming permits would be required on private property, legislation would be required enabling public sector enforcers to monitor and issue citations in support of the program.

Where parking taxes are part of a travel demand management program, program evaluators are needed to track overall program effectiveness. Evaluators should track changes in parking rates and trends in transit use and ridesharing in the affected area. An effective program will show an increase in long term parking rates, and a decline in solo driving and increase in transit and rideshare use, presuming other possible causes of such declines can be ruled out (e.g. changes in gasoline prices).

C. ADMINISTRATION

Policy: The usual enabling instrument is local ordinance, either within the defined powers of localities to ordain or specifically authorized by particular state law.

Fee Collection: As previously mentioned, at the least burdensome level for the public sector, parking operators would be required to collect the tax. If long term parking is the focus of the tax, it might be collected only from parkers on monthly leases or those parking over four hours. Another collection option is for the public sector to sell special permits for all long term parking in certain zones and facilities. In this case, collection would come from sale of permits through government offices and retail stores on a commission basis.

Eligibility: An important decision in program design relates to entities eligible and not eligible for taxation. An example is a tax on commercial parking based on proceeds or number of stalls. Other names for these approaches are revenue and space taxes. In increasing scope, these taxes may fall:

- Narrowly on private parties in the commercial parking business who explicitly charge for parking and derive profits from parking.
- More broadly, the taxes may fall on any private provider of parking charging a fee, including office owners who charge tenants parking fees whether explicitly or within broad leases and who may or may not make a profit on parking charges.
- More broadly still, the taxes may fall on any public or private party providing parking whether or not the parking is charge parking, and whether or not for profit.

Another way to influence commuter parking pricing is to tax the act of or use of parking. Under this approach, parkers, not providers of parking, are eligible for the tax. As mentioned, where such a user tax is imposed on parkers in commercially operated facilities, the parking business may collect the tax and remit it to a public entity. In this case, the parking operator is an agent of the tax collecting authority. Operators of the parking would have to keep track of the number of vehicles, or sale of parking permits to users of parking spaces. The user tax could be imposed on parkers at facilities operated by commercial parking businesses, the public sector or private building owners.

Reporting: The main reporting requirements for parking taxes fall upon parking operators should they be collectors of the tax. In this case, parking operators have to file a tax return form identifying parking facilities, rates charged, number of spaces, and proportion of lease parking or long term parking. Depending on the expected volume of returns and the tax collection burden, reports and collection might occur annually or quarterly.

Localities should make annual reports to decision makers on tax revenues and, if possible, the effectiveness of the program in encouraging transit and rideshare use. See Monitoring and Evaluation section.

Policy Coordination: To enhance acceptability and, ultimately, effectiveness the tax probably should be implemented in parallel with improvements in transit and ridesharing services. Hence, another implementation issue is, can such improvements be funded from tax revenues? State law will determine the legal impediments to local jurisdictions using tax funds to deliver or contract for transit or transportation systems management services. The important considerations are:

- Is the jurisdiction receiving services from a contract in consideration of payment for services?
- Is the contractor assuming responsibilities which cannot be delegated by the jurisdiction, such as levying taxes?

As long as the answer to the first question is yes and the answer to the second is no, the jurisdiction should be safe from successful challenge.

Acceptability and effectiveness also may depend on insuring against overly ample and underutilized parking supplies. As noted, such supplies may make parkers more resistant to a tax program. One safeguard is to insure parking code requirements keep supplies on the tight side.

As with any measure aimed at influencing parking and travel behavior, certain collateral actions may be important to consider, including:

- Increased transit and carpool services
- Preferential parking for residents in nearby neighborhoods
- Set aside or validated parking for shoppers
- New timed and metered zones around the priced employment sites
- Strong enforcement of timed parking and against meter feeding.

Cost/Revenues: Parking taxes are likely to generate revenues for the public sector at the same time they reduce parking revenues to the parking industry. As mentioned, in the case of San Francisco where effects of the tax were evaluated, parking industry gross revenues declined 31 percent from the year before the tax, and gross revenues to the City amounted to $5.5 million per year[7].

If the parking tax is implemented directly by the public sector through a requirement for purchase and display of special parking permits, the cost implications are hard to gauge. Both Eugene and Santa Cruz implemented comprehensive new permit programs in the early 1980's costing between $30,000 and $50,000 per year in administration and enforcement alone. Additional costs included expanded transit service. However, both programs covered their operating costs in parking revenues and citations.

Where parking taxes substantially increase parking rates charged, the result may be reduced employee parking demand. Consequently, employers may reduce the amount of parking they need to lease from building owners. As previously noted, lease parking per stall may range from $30 to over $100 per month in U.S. cities.

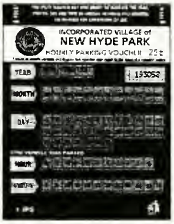
In the long term, to the extent employee parking demand is reduced through parking taxes, developers will save by reducing the amount of garage and parking lot space necessary to service commuters. As an illustration, suppose the developer is allowed to build 1,000 fewer surface spaces around an office building because of reduced commuter parking demand. As previously indicated, a developer building 1,000 fewer surface spaces around an office building might enjoy amortized annual savings of about $95,500 per year, assuming a 30 year time period and 10 percent discount rate. Operations and maintenance savings might be $100 per space per year, for a total savings of $100,000.

D. PHYSICAL FACILITIES

Entrance/Exit Systems: The strategy requires no change to entry/exit systems, though it may require changes in associated software for accounting and collection auditing.

Permits/Stickers: One way to impose a parking tax on parkers rather than providers of parking is through a parking permit system. See above discussion including examples of areawide permit schemes. For example, if long-term parking is the focus of the tax, the public sector may choose to sell special permits for all long-term parkers in specific areas or facilities. Operators of surface lots without attendants may also require permits.

Signs/Information: Operators must change fee signs to post the new tax and/or new rate schedule.



INCORPORATED VILLAGE of
NEW HYDE PARK
HOURLY PARKING VOUCHER 25¢

YEAR
133052
MONTH
DAY
HOUR

Stall Layouts: The strategy requires no change.

Security/Enforcement: This strategy requires no additional security systems or hardware. However, additional enforcement is needed to monitor any permit system used to implement the tax.

E. MONITORING AND EVALUATION

Monitoring: A parking tax program should be carefully monitored not only in terms of collections and evasion but potential impacts on travel behavior. Parking managers and planners should track:

- Mode shares of commuters into the taxed zone.
- Parking utilization and turnover at taxed facilities and at non-taxed facilities and streets.
- Parking violations and meter feeding. Some commuters can be expected to feed meters and shuffle cars in time restricted zones in response to parking price hikes.
- Parking revenues, along with administrative costs and potential effects on the parking industry.

Evaluation: Evaluating the impact of parking taxes on commuter travel behavior is quite complex. First evaluators must establish the tax has been passed through to commuters in the form of increased prices. Next, evaluators must track the utilization of parking facilities by both long and short term parkers. Preferably, this should be done both in and outside the taxed zone to separate out the effects of factors other than taxes, including changes in gas prices or regional economy. Finally, employee surveys should be carried out to spot changes in mode and parking location. Such surveys will indicate to what extent pricing may have reduced solo driving, increased carpool and transit use or shifted commuters to new parking locations. By asking those who have switched modes about their prior mode, the survey also should determine the degree to which the program is drawing carpool users from transit, walking and cycling as opposed to solo driving.

1 "Unique Private Parking Tax Vetoed," Urban Transportation Monitor, Vol. 4, No. 10, May 1990.

2 "Parking Tax in Washington State," Cy Ulberg, Graciela Etchart, Paper presented before the Transportation Research Board, January 1991.

3 Interview with Cy Ulberg, University of Washington, October 1993.

4 "Beverton, OR," Urban Transportation Monitor, Vol. 7, No. 6, April 2, 1993: p.5.

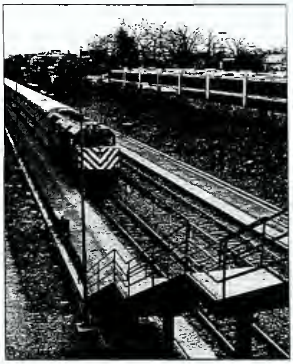
5 "A Review of the Impact of Parking Policy Measures on Travel Demand," Bernard Feeney, Transportation Planning and Technology, Vol. 13, 1989.

6 Damian Kulash, "Parking Taxes as Roadway Prices: A Case Study of the San Francisco Experience," The Urban Institute, 1974.

7 Damian Kulash, Op. Cit.

III

PARKING PRICING STRATEGIES



MODIFY/CASH OUT EMPLOYER PARKING SUBSIDIES

Definition: End or reduce employer subsidy of employee parking, or provide employees with the cash equivalent of the subsidy.

A. PLANNING

How It Works: Employers often subsidize employee parking in one of two ways. They may own surface or garage parking which employees use at no charge, or they may lease parking on- or off-site and provide the space to employees for free or at a discount relative to the lease rate or market value. Such subsidized parking encourages employees auto use. In either case, those who drive alone get a benefit--a free parking space--that employees who rideshare, use transit, walk, or bike cannot get.

Employers can alter this policy in one of two ways. One is a "cold turkey" approach where employers simply stop subsidizing parking or reduce the subsidy substantially. The other approach is to provide an option to the subsidy in the form of cash. Under the "cash out," employers offer subsidized employees a choice of continuing to accept subsidized parking or taking the cash equivalent of the subsidy. The rationale for the cash out is some employees receiving free or subsidized parking may prefer to "pocket" the cash and take transit or carpools to work.

Most Applicable Contexts: Can be implemented by either the private or public sector in off-street lots and garages. Attacking employee parking subsidies is applicable in areas with parking pricing; with high proportions of highly subsidized parkers; where parking is costly to build, own or lease; where the parking supply is well utilized or allocated by wait list, while at the same time there are pressing needs to reduce traffic and associated pollution problems. Generally, then, applies in more dense urban areas with an existing market in parking.

The "cash out" is especially appropriate where employers lease parking for employees. It is easier for employers to reduce their supply of lease versus owned parking as they cash out employees. In the only state law on cash out, California requires employers to offer the cash out option, provided the employer can reduce parking lease costs as the cash out is paid (the need for parking is reduced as some employees accept the cash out and park elsewhere or turn to transit and ridesharing, at least part of the time). Employers with owned parking also might be able to implement the cash out at no net loss, assuming they can rent out space freed up by employees taking the cash out. The cash out also has more potential at employment sites with high proportions of lower paid employees since it is taxable as income to employees and therefore more attractive to those in lower rather than upper income brackets.

As with any measure intended to influence parking rates charged to commuters and long term parkers, other variables favoring application of the measure are:

- Competing parking supplies (other private, public, commercial) are well utilized and priced, thereby limiting opportunities for solo drivers to simply shift parking locations.
- Transit capacity is frequent and not saturated, or is soon to be improved, offering a good alternative for drivers affected.
- Uncontrolled supplies (streets, vacant land, neighborhoods) are at a minimum or new controls and or enforcement are planned.

Examples: Several government and private employers have implemented employee parking pricing programs:

- The U.S. Federal Government charged employees for parking at selected federal facilities, reversing a previous policy of free parking.
- The Federal Government of Ottawa charged near market price for employee parking in Ottawa to encourage carpooling and transit use.
- Commuter Computer in Los Angeles phased out free employee parking over a two year period, except for employees using their cars at work. The company offered free parking for carpoolers.
- Several other public and private employers have ended free or below market parking pricing while offering discount carpool parking, preferential parking location, transit passes or travel allowances. They include the Nuclear Regulatory Commission, Pacific Northwest Bell (now US West), CH2M HILL, Twentieth Century and Bellevue City Hall.

Overall, however, a small proportion of employers appear to have increased charges for solo drivers or implemented cash out of parking subsidies. As previously noted, a survey of Los Angeles employers finds less than four percent of the work sites introduced parking pricing as a strategy to encourage ridesharing[1]. A recent study of California cash out legislation finds "many employers have not yet implemented the law," apparently because employers who offer the cash out are unable to offer tax exempt parking to employees, as is possible if parking for employees is not cashed out[2].

Keys to Effectiveness: The effectiveness of employer parking pricing and subsidy reduction in reducing solo driving depends on:

- Proportion of employees receiving subsidized parking
- Current pricing levels and changes in the price level
- The attractiveness of travel and parking alternatives

Where there are large proportions of employees subsidized for parking, ending or cashing out the subsidy could be very effective in reducing auto use. For example, one study of Los Angeles commuters estimates the cash out might reduce solo driving by as much as 24 percent[3]. Current price levels and the degree of subsidy are other considerations. Where employees already pay some proportion of parking costs and where the price of parking is relatively high, increasing the price such employees pay (by "cold turkey" or "cash out") by a certain percent will have more effect than increasing a relatively low price by the same percent[4]. Finally, much depends on how attractive are other parking and travel options. For example, ending or cashing out employee parking subsides simply may shift many employees from expensive garage parking to low cost surface lots if such parking is readily available. Without a low cost alternative parking supply and with plentiful transit capacity, more may shift to transit.

Effectiveness Experience: There are several documented cases of significant declines in solo driving and trip making resulting from employers imposing parking pricing, or removing employee parking subsidies, whether alone or in combination with alternative mode programs:

- U.S. Federal Government: The federal government charged employees for parking at selected federal facilities, reversing a previous policy of free parking. Rates were changed from mostly free to one-half the rates at nearby commercial lots. The reduction in the number of autos commuting ranged from one to 10 percent in central city areas, and between two and four percent in suburban locations[5].

- Federal Government of Ottawa: The federal government began charging near market price for employee parking in Ottawa. Solo driving decreased by 20 percent (from 35 percent to 28 percent of employees), with large shifts to transit even among higher income employees[6].

- The Nuclear Regulatory Commission: Began charging market rates for parking ($60 per month in its garage and $30 per month at surface lots) in combination with guaranteed parking spaces for carpoolers in the garage (no discount parking) and enforcement of parking restrictions on street near the building. Solo driving declined 22 percent compared to before pricing, from 54 percent to 42 percent. The 42 percent solo share is about 40 percent below solo shares of other employers in the area[7].

- Commuter Computer: This Los Angeles company dropped the drive alone share from 42 percent to 8 percent by eliminating free parking[8].

- Bellevue City Hall: The long standing City sponsored rideshare and fleet ridesharing program had little effect on solo driving before parking pricing. When the City began charging $30 per month for employee parking where previously parking was free, solo driving dropped 17 percent[9].

- Cash Outs: The Sacremento Chamber of Commerce, Sierra Research of Sacramento, and City of West Hollywood reduced solo driving between 16% and 23% by offering cash allowances to employers who gave up parking[10].

Compliance with Ordinances, Codes: Trip reduction ordinances or air quality regulations sometimes encourage attention to modifying employer parking subsidies to employees. Developers sometimes are required to implement some form of pricing for employee parking through developer agreements. Cash Out legislation may be implemented by local or state ordinance.

B. HUMAN RESOURCES

Human resources are needed for several functions. If parking collection or attendant personnel already are present, ending employee free or discount parking or cashing it out will not impose significant new administrative burdens. However, where such personnel are not present, then a new parking attendant may be needed for collections at gates or to enforce meters or permits. Personnel time also is needed to determine eligibility and certify legitimate carpoolers for pricing discounts, presuming rideshare patrons will be offered discounts under new pricing schemes. Under a cash out approach, some personnel time is needed to keep records of employees receiving the cash out (it is taxable under current law). Finally, personnel time is needed to make program modifications and evaluate the program. As stated in previous sections, where an employer has an assigned Transportation Coordinator, this person can carry out most if not all the necessary functions. In such cases, Coordinators can spot check permit holders to insure legitimate ridesharing (if a preferential carpool parking program is part of the parking pricing package). They also can track overall program effectiveness through regular employee transportation surveys.

C. ADMINISTRATION

Policy: Employers can be encouraged to reduce or eliminate parking subsidies through travel demand management ordinances. Cash out policies may be implemented by employers on their own or may be required or encouraged by the public sector by state or local legislation.

Fee Collection: Parking charges are collected through parking attendants at gates or by meters or permits. See Physical Facilities section for more information on collection mechanisms. Cash out is paid to employees through payroll or separate travel allowance.

Eligibility: Eligibility criteria for removal or cash out of subsidized parking are an important consideration. At the employer level, it may be best to make some employees eligible for revised parking pricing policies or cash out while exempting others. For example, the Los Angeles County Charge Parking and Travel Allowance Program (not a true cash out, but instructive nevertheless) excludes Judges and Commissioners of the Municipal or Superior court; employees assigned to double shift operations; all "mileage permittees" (those using personal cars as a condition of work); employees who begin work on a regular shift beginning before 6:00 a.m. or after 2:00 p.m.; and rotational shift employees in the Sheriff's Department. Where employers perceive a conflict between cashing out employees and policies providing for use of personal vehicles as a condition of work, one approach might be to follow the Los Angeles County example and simply exclude from the program employees using personal vehicles as a condition of work.

At the locality level, a cash out ordinance might exempt employers from ordinance requirements until expiration of collective bargaining agreements binding employers to provide subsidized parking. The ordinance should not conflict with or supersede employer obligation under any such agreement. Exemption also is needed to account for certain parking lease provisions. Under the cash out, employers might be exempted whose current parking leases prevent reductions in the number of stalls without penalty. The exemption should run only until expiration of the lease. The cash out also might exempt owned parking spaces, if the owned parking issues proves a barrier to the political feasibility of a cash out ordinance. Another option might be to exempt only those owners who can demonstrate significant financial penalty resulting from inability to utilize parking freed up under the cash out.

If discount parking for carpooling is part of the parking pricing program, then all the eligibility issues discussed in previous sections apply. Will a carpool be set at two or more or three or more persons? Will carpoolers be required to arrive in the parking facility with members or are drop offs allowed? Will eligibility hinge on a minimum number of days per week of carpooling?

Reporting: If the jurisdiction has a travel demand management ordinance, an employer may be bound to report regularly on the number of solo drivers and carpoolers. If not, it still is advisable to keep careful records of employee commute mode to facilitate evaluation and support voluntary reporting to the jurisdiction, other employers or local Transportation Management Associations.

Under a cash out ordinance, localities may require an annual report from employers on numbers of employees receiving the cash out and types of postings or other information provided to employees to notify them of the ordinance.

Policy Coordination: Given the potential effectiveness of subsidy removal or cash out, collateral policies and programs may be important to consider, including:

- Increased transit and carpool services
- Preferential parking for residents in nearby neighborhoods
- Set aside or validated parking for shoppers
- New timed and metered zones around the priced employment sites
- Strong enforcement of timed parking and against meter feeding

If employers couple subsidy reduction or cash out with discount carpool parking, they should coordinate with discount carpool parking policies adopted by local jurisdictions. As stated in previous chapters, some jurisdictions may encourage carpooling at public lots or employment sites through discount or free parking. It may be wise to be consistent with public policy on eligibility and other matters especially where an employer's parking facilities are close to such public lots. An employer preferential parking program which is less attractive than the preferential program at nearby city or county parking open to the public will detract from use of the employer's program.

Finally, employers need to coordinate parking subsidy reduction or cash out with labor union policies and agreements. Where parking privileges have been negotiated as a formal benefit between labor and management, the cash out probably will require negotiations. Unions may or may not resist the cash out depending on the package of wages and benefits under negotiations at the time cash out options are brought up. One point of contention might be that the cash out is a benefit to only one segment of employees, those eligible for parking privileges. Union representatives may push for a broader based benefit, such as the travel allowance applying to all employees.

Cost/Revenues: Usually, there is minimal cost in implementing subsidy reduction or cash out at employment sites where parking pricing already is in place. Costs for changes in notices and accounting operations are minimal. However, if pricing is entirely new to the site, new gated systems are needed for parking garages and costs increase. As provided in a previous chapter, card access control systems cost between $6,000 and $7,000 per lane, with cashier systems at about $10,000 per lane for entrances and about $25,000 per exit lane. If garages or surface lots are fitted with meters, these cost between $250 and $400 installed. Electronic boxes are available for controlling large numbers of spaces. Units accepting coins, bills and credit cards cost about $20,000 (excluding installation). If hang tag permits are used, costs are up to $3 per tag. New electronic tags (debit cards) are available which cost about $30 per unit.

Costs also depend on whether subsidy reduction or cash out are accompanied by discount carpool policies. As mentioned in previous chapters, the ease of monitoring carpool discounts depends on whether there already are parking attendants managing garage or lot parking. The employer or building management must either check for carpool permits or monitor occupancy as vehicles arrive in lots and garages. If parking collection or attendant personnel already are present, the added cost of monitoring carpoolers will be small. However, where there are no such personnel, a transportation or parking coordinator must be designated to spot check carpool parking.

Costs shift under subsidy reduction and cash out programs. Where employers subsidize the parking of employees, ending the subsidy will reduce the employer outlay on parking costs, but impose a new cost on employees. Where the employer substitutes a cash allowance for the parking subsidy, there may be no net cost to employers since employees getting the subsidized parking instead get the equivalent in cash. However, employees not subsidized for parking may also demand the cash travel allowance, in which case the employer outlay may go up. Employees receiving the cash allowance may or may not perceive any added cost, depending on the value of the parking subsidy relative to the allowance. Upper income employees may value parking subsidies very highly compared to the cash equivalent, as the travel allowance is taxable and subsidized parking is not. Of course, any employees previously not receiving the parking subsidy (e.g. transit users, walkers and drop offs) who receive a new cash allowance are better off than previously.

In the long term, to the extent employee parking demand is reduced through parking subsidy reduction or cash out, developers will save by reducing the amount of garage and parking lot space necessary to service commuters. As an illustration, suppose the developer is allowed to build 1,000 fewer surface spaces around an office building because of reduced commuter parking demand. As previously indicated, a developer building 1,000 fewer surface spaces around an office building might enjoy amortized annual savings of about $95,500 per year, assuming a 30 year time period and 10 percent discount rate. Operations and maintenance savings might be $100 per space per year, for a total savings of $100,000.

D. PHYSICAL FACILITIES

Entrance/Exit Systems: The strategy requires no addition to or change in entrance/exit systems.

Permits/Stickers: No permits or stickers are required to implement the cash out. However, rideshare patrons would display special discount tags, if discount parking is offered as part of the cash out program.

Signs/Information: Information signs might be added to inform parkers of the cash out option. If carpools are offered both price discounts and preferential close-in parking as part of the cash out, then carpool stalls must be signed.

Stall Layouts: No changes are required.

Security/Enforcement: This strategy requires no additional security systems or hardware. However, additional enforcement is needed to enforce preferential carpool parking. See discussion below on Monitoring and Evaluation.

E. MONITORING AND EVALUATION

Monitoring: Employers should monitor the proportion of parkers and users of the cash out under subsidy reduction or cash out approaches. It also is important for employers to monitor any exceptions to the subsidy reduction or cash out program. For example, if those with personal car use assignments as a work condition are exempted, it is probable requests for personal car use may well increase. Thus, it may be appropriate to tighten the approval process for personal car use at the same time a cash out is implemented. For example, Los Angeles County requires "mileage permittee" approval by not only department heads but the Auditor Controller as a way to discourage abuse of the policy.

If discount carpool parking is offered as part of the subsidy reduction program, then it is important to monitor the privilege for abuse. The best preventive measure is simply to require carpoolers to arrive together to be eligible for discount parking. In this way, spot checks can determine compliance immediately. If drop off is allowed, enforcement is much more difficult. In this case, it is necessary to call poolers periodically in an effort to determine if residence or work times have changed and whether they are still carpooling. Such checks are not a full proof deterrent to determined abusers but can cut down the rate of abuse.

The public sector incurs a monitoring task under a cash out ordinance. A state or locality enforcing the ordinance must carry out spot checks or require an annual report to the regulating organization. Monitoring also entails a periodic check of parking market rates and cash out subsidies paid relative to market rate. Public jurisdictions also might be wise to check mode shares of commuters periodically at selected employers under the cash out; parking utilization and turnover at priced facilities and at nearby facilities and streets; and parking violations and meter feeding.

Evaluation: Program managers for the parking and travel demand management program can track overall program effectiveness through regular employee transportation surveys. An effective program will show a decline in solo driving and increase in transit and rideshare use, presuming other possible causes of such declines can be ruled out (e.g. changes in gasoline prices). By asking those who have switched modes about their prior mode, the survey also should determine the degree to which the program is drawing carpool users from transit, walking and cycling as opposed to solo driving.

1 "Regulation XV: Beginning to Show Results," Giuliano, Genevieve and Martin Wachs. ITS Review, Volume 15, No. 1, November 1991.

2 Parking Cash Out Evaluation, Cordoba Corporation for the South Coast Air Quality Management District, November 15, 1995.

3 "The Effects of Employer Paid Parking in Downtown Los Angeles," by Richard Willson and Donald Shoup, UCLA School of Architecture and Urban Planning, May 1990.

4 Richard Willson and Donald Shoup, "Employer Paid Parking: The Problem and Proposed Solutions," for the Association of Commuter Transportation, December 1990.

5 Gerald Miller and Carol Everett, "Raising Commuter Parking Prices -- An Empirical Study," Transportation, Volume 11, 1982.

6 Gerald Miller and Thomas Higgins, "Implementing Parking Pricing Strategies," The Urban Institute, 1983.

7 "Evaluation of Travel Demand Management Measures to Relieve Congestion," Richard Kuzmyak and Eric Schreffler, Comsis Corporation, for the Federal Highway Administration, February 1990.

8 Monica Surber, Donald Shoup, and Martin Wachs, "The Effects of Ending Employer-Paid Parking for Solo Drivers," University of California, Los Angeles, California, 1984.

9 "The Difficulty With Easy Ride: Obstacles to Voluntary Ridesharing in the Suburbs," Stephenie Frederick and Kay Kenyon, Presentation Paper before the Transportation Research Board, January 1991.

10 Parking Cash Out Evaluation, Cordoba Corporation, for the South Coast Air Quality Management District, November 15, 1994.

III
PARKING PRICING STRATEGIES

ON-STREET PRICING

Definition: Discourages long term parking on-street through meters or priced permits; encourages car and vanpooling by providing free or discount parking on-street in priced zones.

A. PLANNING

How It Works: For pricing, meters or permits are required for parking on-street. To discourage long term parkers, meter rates might be set to escalate over time, discouraging long term parking. New electronic meters allow variable rates, progressively more expensive for each additional hour. Where long term parkers feed meters in violation of posted time limits, enforcers chalk tires and/or note license plate numbers to enforce time limits. New hand held electronic devices allow enforcers to spot vehicles with large numbers of unpaid violations. Some jurisdictions "boot" and tow such vehicles so they cannot be driven until fines are paid. For carpool preference, authorized vehicles displaying a permit are allowed to park at certain meters (usually long term) without paying. No parking times (e.g. 4-6 p.m.) must be observed. No spaces are guaranteed. There is a charge for preferential permits. Carpool meters are selected where long term parking will not impede traffic flow or use spaces supporting commercial activity.

Most Applicable Contexts: Preferential parking for desirable modes is most applicable in existing metered zones within walking distance of employment sites, especially where tight and/or expensive off-street parking provides an incentive to commuters to park on-street. Escalating rates at parking meters, time limits and strict enforcement apply where commuters feed meters and/or shuffle cars to avoid meter zonae time limit regulations.

Because on-street pricing also encourages greater turnover, it is applicable to areas where businesses desire more customers willing to pay to park rather than those only willing to park for free[1].

Examples: On-street meters are very common in U.S. cities, though permits or debit cards are less common. There is very little use of on-street preferential parking for carpoolers or escalating meter rates, but more use of strict enforcement. Examples of on-street carpool parking programs are in cities named below. Aggressive and strict enforcement programs combining plentiful enforcement, towing and booting are documented in Boston, Washington D.C., San Francisco, Colorado Springs and Billings, Montana[2].

Keys to Effectiveness: As with off-street preferential parking for encouraging ridesharing or clean vehicle parking, all depends on the relative attractiveness of preferential parking. For example, preferential meters close to building entrances will provide a shorter walk and possibly a sense of enhanced security compared to walking from a couple of blocks away. Effectiveness may be blunted in areas where transit use is substantial, as preferential parking may encourage some switching from transit to carpooling.

On-street pricing and strict enforcement against meter feeding serve as support strategies for other programs aimed at reducing auto use. For example, they support both restraints on the supply of off-street parking (e.g. reduced minimum requirements, maximum requirements and caps on areawide supplies) as well as parking pricing measures (e.g. increased parking pricing for commuters, removal or cash out of employer parking subsidies, parking taxes). In short, these strategies support any program attempting to shift commuters away from solo driving by minimizing commuter "spillover" onto streets intended for shoppers or residents.

Effectiveness Experience: There are few evaluations of on-street preferential parking programs:

- A Portland program allowing carpool parking at street meters found about 40 percent of the users were previous carpoolers, and 29 percent were former bus riders among the approximately 950 people using the program[3].
- In Seattle, 193 carpools were certified for the program as of 1984, but no prior mode was documented[4].
- Other evaluations of off-street preferential parking programs (see chapters on Preferential Parking under Supply Strategies and chapter on Occupancy Pricing under Pricing Strategies) indicate mixed effectiveness of the strategy, with some successes and failures. Very probably, all depends on the specific site, commuter population and incentive structure.

There have been evaluations of how increased enforcement stems violations of on-street regulations, including unpaid and over-stays at meters. Presumably such enforcement encourages more use off-street parking and, where such parking is tight and expensive, more use transit and carpools. Case studies of increased enforcement in Washington, D.C. and Cambridge, Massachusetts showed dramatic increases in ticketing and reduced parking violations. The result was a drop in parking violations, a drop in long term parking (presumably by at least some commuters) and an increase in short term parking (presumably mostly shoppers)[5]. See discussion under the section, Timed Curb Zones.

Violation of meters can be a significant problem in some cities. One study of parking at meters in Ann Arbor, Michigan found 60 percent of vehicles parked at meters were in violation of both the required fee and legal time limit[6].

Compliance with Ordinances, Codes: On-street meter rates are set by municipal policy, administrative action or action of parking commissions. Enforcement policies and procedures must be in compliance with certain adopted ordinances, fee schedules, personnel policies and adjudication procedures. See section on Administration.

B. HUMAN RESOURCES

As with regulation of on-street timed parking, localities require human resources to administer, operate and enforce regulation. Increasingly, localities are turning to contracting of enforcement functions so that administration focuses more on contract management than direct provision of service[7].

Where localities administer their own programs, human resources must be allocated to several important operational and administrative systems. Some include constant staff training to minimize erroneous or inconsistent enforcement; towing and booting procedures; impound vehicle procedures; public information; and adjudication, whether carried out by locality criminal courts or traffic departments. Such a system must quickly hear and decide cases, minimize wait time and not overburden the judicial system[8]. Many jurisdictions have decriminalized parking violations, thereby removing them from the criminal court to an administrative adjudication[9].

For on-street preferential carpool parking programs, a department must be designated to carry out the program. In Portland and Seattle, traffic engineering and transportation departments are responsible for designating eligible areas, while the regional rideshare agency certifies eligible rideshare patrons, sells permits and promotes the program. City enforcement personnel issue citations.

C. ADMINISTRATION

Policy: Parking ordinances establish meter zones, regulations and penalties against violation. Localities may require a new ordinance or revision in current parking ordinances to establish preferential parking at meters, new escalating rates at meters and associated fine structures. Ordinances or charters also establish department responsibility as to police versus civilian duties and legal authority for administrative adjudication, if needed. Increased enforcement or fines generally do not require new ordinances, though authority to "boot" vehicles may require amendments to existing ordinances and regulatory codes.

Enforcement policy must be balanced. Lax enforcement will encourage parking beyond any time limits in meter zones ("meter feeding"). Strict enforcement will encourage more compliance. However, there are two problems with overly strict enforcement. One, it risks merchant displeasure and public protest. Two, some commuters can be expected to feed meters or "shuffle" cars within the zone[10]. The City of Palo Alto is considering a plan to attack the problem of shuffling. The city proposes to divide downtown into four zones, prohibit parking in any one zone for more than two hours per day and record all license plates by hand-held computers to spot the shufflers[11]. As a general rule of thumb, an enforcement program should ensure areas with on-street parking restrictions are enforced at least three times per day.

Fee Collection: Meter revenues and citation fines comprise the fee sources in the regulation and enforcement of meter parking. For areas where parking meters are inappropriate for collecting fees in on-street pricing programs, some localities have turned to permits or debit cards. See discussion below under Physical Facilities.

Fee collection from enforcement is not easily accomplished. Collection rates for on-street enforcement may be as low as 35 percent or less[12]. Accordingly, some states now put holds on renewal of vehicle registration until delinquent violations are paid.

Reporting: Departments responsible for regulation and enforcement of on-street meters must report to decision makers on a number of procedural and performance measures. Some measures typically include gross and net revenues, citations issued per zone per year, fine collection rates, public complaint volumes and service level measures such as enforcer passes per hour or day in regulated zones.

Policy Coordination: On-street pricing should be coordinated with local travel demand management and parking code policies. Strong enforcement of street regulations can encourage commuters to consider travel alternatives promoted by travel demand management programs. Also, on-street pricing support parking supply restrictions such as maximums and caps, again insuring commuters do not poach retail or other short term parking areas and instead give strong consideration to transit and rideshare alternatives.

Cost/Revenues: On-street pricing through meters generally generates net revenues for a locality. For example, a recent study of parking meters in San Francisco showed revenues per meter of $518 (fiscal year 91-92) and costs of $118, including maintenance, counting, and annualized capital. Thus, in this case, costs are only 23 percent of revenue. The gross city revenues are about $10 million per year from 21,000 meters[13].

For most on-street enforcement programs, citation revenues usually exceed enforcement costs, and may be used to support a variety of locality services. For example, parking enforcers wrote 2.6 million tickets in San Francisco in 1992, with fines netting $20 million after ticket writing costs. Revenues go into the City general fund[14].

If some portion of revenues were dedicated to transportation or other improvements in areas where meters are located, it may make initiation of on-street pricing more acceptable.

D. PHYSICAL FACILITIES

Entrance/Exit Systems: No entrance or exit systems are associated with this strategy. On-street parking usually is implemented through parking meters. Meters may be present at every stall or one master or central meter may serve several stalls. Such centralized meters are in place in Fort Lauderdale, Florida and Aspen, Colorado. Meters are located mid block and payment options include coins, token or debit cards.

Permits/Stickers: For areas where parking meters are inappropriate physical facilities for collecting fees in on-street pricing programs, some localities have turned to permits or debit cards. Santa Cruz County has operated for 13 years an on-street pricing program along nearly 4 miles of coastline neighborhoods. The intent is to reduce long term parking by beach users in residential areas. Annual and daily permits are sold from vans roving the area. Residents are allowed two free permits. Likewise, the City of Eugene, Oregon has for 12 years regulated parking on residential streets around the University of Oregon by selling permits for long term parking[15]. Fort Lauderdale uses pre-paid debit cards ("Parkulators") looking like calculators which hang on rear view mirrors[16]. Some cities in Europe and England regulate all on-street parking with permits instead of meters, claiming advantages in reduced capital costs, vandalism and the prevention of parking on the payment of the previous parker[17].

Signs/Information: Signs are required to post time limits and regulations. If preferential parking is offered to carpoolers at meters, signs should indicate required permits, penalties for abuse and the administering department.

Stall Layouts: Where on-street meters are used, priced parking streets have "tick marks" designating stalls. Where permits are required or payment at a centralized meter, streets may or may not have designated stalls.

Security/Enforcement: On-street priced zones require enforcement by chalking or hand held "ticketwriters." "Boots" also may be needed to enforce against repeat offenders.

E. MONITORING AND EVALUATION

Monitoring: Tracking use of on-street carpool stalls is the most critical monitoring issue in on-street pricing strategies. Monitoring is difficult because there is no checkpoint to monitor arrivals as with off-street facilities. The usual approach is to issue monthly permits (e.g. $15 per month in Portland) to eligible carpoolers who fill out applications. Spot check monitoring determines if ineligibles are poaching stalls and whether eligible rideshare patrons are continuing to pool. In Seattle, an employee of the rideshare agency randomly checks certified carpoolers by telephone to see if they still qualify.

It is very rare for on-street control programs to be monitored and evaluated in terms of traffic management purposes. Usually, monitoring focuses on gross meter revenues, citation volumes and payment levels, enforcement personnel services and public complaints. Occasionally, programs are examined for their effects on parking duration and turnover levels. However, it should be possible to monitor and evaluate control programs where they are instituted in part to support travel demand management efforts. By evaluating trends in violation rates, citations, parking duration and shuffling in areas close to employment centers with travel demand management programs, it should be possible to gauge the overall effectiveness of parking enforcement in discouraging long term parking.

1 Donald Shoup, “Cashing Out Curb Parking,” Access, Spring 1994, p. 7.

2 "Innovations in Parking Management,” for the Urban Mass Transportation Administration, Public Technology, Inc., Washington, D.C., 1982.

3 "Study of Parking Management Tactics Volume 1: Overview,” John DiRenzo, et. al., Peat, Marwick and Mitchell, December 1979.

4 "Auto Parking Trends,” Wilbur Smith Associates, Planning Magazine, American Planning Association, June 1983.

5 "On-Street Parking Management Programs,” Raymond Ellis, Transportation Research News, No. 98, January-February 1982.

6 "On-Street Parking Meter Behavior,” Aaron Adiv and Wanzhi Wang, Paper before the 66th Annual Meeting of the Transportation Research Board, University of Michigan Transportation Research Institute, 1987.

7 "Privatizing On-Street Parking Operations,” Toby Fox, California Parking Professional, Fall 1994.

8 "Study of Parking Management Tactics Volume III: A Reference Guide,” John DiRenzo, et. al., Peat, Marwick and Mitchell, December 1979.

9 "A Systems Approach to On-Street Parking Enforcement,” Jim Kennedy, National Parking Association, February 1994.

10 Santa Barbara has documented this behavior and dubbed it “the 90 minute shuffle.” See “Santa Barbara’s Experience with Free Parking,” Mike Lowe, Parking Professional, IMPC, May 1991.

11 "Musical Cars May End,” The Parking Professional, September 1993.

12 "A Systems Approach to On-Street Parking Enforcement,” Jim Kennedy, National Parking Association, February 1994.

13 "Parking Vouchers: A Feasibility Study,” Gerald Robbins, The Parking Professional, May 1994.

14 Parking Professional, IMPC, August 1993.

15 Interviews with Corky Wallace, Santa Cruz County; Kay Kronholm, City of Eugene, October 1993.

16 "Parking in the News,” The Parking Professional, January 1992.

17 "Innovations in Parking Systems,” California Public Parking Professional, Winter 1993; also, “Parking Vouchers: A Feasibility Study,” Gerald Robbins, The Parking Professional, May 1994.

5-76 6-25-76